22900162438

1865

WELLCOME HISTORICAL MEDICAL LIBRARY STORE,
WELLCOME CHEMICAL WORKS,
805, BAY 1,
DARTFORD, KENT.

PHARMACEUTICAL JOURNAL

AND

TRANSACTIONS.

VOLUME XV.

1855–56.

EDITED BY

JACOB BELL.

LONDON:
JOHN CHURCHILL,
NEW BURLINGTON STREET;
MACLACHLAN & STEWART, EDINBURGH; AND FANNIN & CO., DUBLIN.

1856.

C. WHITING, BEAUFORT HOUSE, STRAND.

WELLCOME INSTITUTE LIBRARY
Coll. welMOmec
Call No. Ser QV1 033

CONTENTS.

VOL. XV.—1856.

No. I.

Pharmaceutical Jurisprudence, page 1.

Transactions of the Pharmaceutical Society: Election of President and other Officers, 3—List of Members, Associates, and Apprentices (*continued*) 3—Pharmaceutical Meeting—Donations to the Library and Museum, 4—Judgment in favour of the Society—Court of Exchequer Chamber, 5.

Phytological Club: Development of the Vegetable Cell. Mr. Grundy, 14.

Provincial Transactions: Liverpool Chemists' Association—On Indian Gums. Mr. Archer, 15—Concentrated Infusion of Senna. Mr. Abraham, 15—Award of the Prize for the Best Essay on Hydrocyanic Acid, 15—Subscriptions to the Liverpool Museum, 16.

Original and Extracted Articles: Charcoal as a Medium of Inhalation. Mr. S. Darby, 16—Tragacanth and its Adulterations. Mr. S. H. Malpass, 18—Practical Rules, &c., in Electro-deposition. Mr. G. Gore (*continued*) 21—Report on the Supply of Spirit of Wine free of Duty, for use in the Arts and Manufactures—Correspondence, 28—Addendum to the Report, 29—New Materials for the Manufacture of Paper. Mr. Durden, 30—The Manufacture of the Chromates, Chromic Acid, &c., 32—Durability of Hydraulic Lime and Cement under the Influence of Sea-Water, 37—Source of Silica in Carbonate of Potash obtained by Calcination of the Bitartrate, 38—Remarks on the Detection of Arsenic in Cases of Poisoning, 38—Purification of Arsenical Sulphuric Acid, 39—Method of Testing Archil, 40—Acidification of Fats under the Influence of Substances associated with them in Seeds, &c., 40—Alteration of Sugar dissolved in Water, 41—Occurrence in Urine of a Blue Substance, resembling the Colouring Substance of Indigo, 42—On Gum Mezgnite, 42—Clarification of Rape Oil, 43—Preparation of a Green Pigment analogous to Schweinfurt Green with Butyric Acid, 43—Post-office Regulations respecting the Transmission of Newspapers and Books, 44—Action to recover Payment for Medicines, 45—Penalty for selling Drugs to Brewers, 47—*Books Received*, 47—*Correspondents*, 48.

No. II.

The Register of Pharmaceutical Chemists, and the List of Members of the Society, 49—The Pharmacopœia Committee, 51—Analysis of the Medical Bill, 51—The Adulteration of Food and Physic, and the Pollution of Water, 53.

Transactions of the Pharmaceutical Society: Confirmation of the Bye-Laws, 56—Resolutions of the Council, 56—List of Members, Associates, and Apprentices (*continued*), 56.

Original and Extracted Articles: On Tragacanth and some allied Gums. M. Guibourt, 57—Practical Rules and Recipes in Electro-deposition. G. Gore, Esq., 59—Syrup of Hydriodic Acid. Mr. James Murdoch, 63—Nitrate of Silver and Tannic Acid in Pills. Mr. Copney, 65—Manufacture of Chromates and Bichromates of Potash, Soda, Lime, &c. (*continued*), 66—The Manufacture of Aluminium. M. H. St. C. Deville, 71—The Constitution of Flame. Dr. W. Hilgard. 73—Hydraulic Lime, Artificial Stones, and some New Applications of Silicates. M. H. Kuhlmann, 80—The Chemical History of the Alkaline Silicates. Mr. Struckmann, 82—The Adulteration of Food and Drugs—Committee of the House of Commons, 84—The State

of the Thames, 91—Destruction of an Elephant, 92—*Review:* Pharmacopœias, Austriaca—and Norvegica, 92—Translation of the London Pharmacopœia (*Second Edition*). Dr. Nevins, 93—*Books Received*, 95—*Correspondents*, 96.

No. III.

The Adulteration of Food, Drugs, &c., 97—Recreation and Education, 101—The Sale of Spirit of Wine, 102.

Original and Extracted Articles: Secret Formulæ. Mr. J. Ince, 103—Practical Rules and Recipes in Electro-deposition. Mr. Gore, 105—Chinese Method of Scenting Tea, 112—Australian Medicinal Plants, 114—The Extraction of Caoutchouc. M. Weddell, 116—The India-Rubber of the Amazon. R. Spruce, 117—Detection of a Cruciferous Oil when mixed with other Fruit or Seed Oil. M. Mailho, 119—Method of Decolourizing Tannin. F. Kummell, 120—Black Stain for Wood. C. Karmarsch, 120—The Purification of Honey, 121—Methods of Analytical Separation and Quantitative Estimation, 121—Cost and Consumption of Coal and Peat Gas in Paris, 124—Aluminium, 124—The Deodorizing and Disinfecting Properties of Charcoal, Lime, Sand, and Gravel, 125—The Adulteration of Food, Drugs, &c.—Committee of the House of Commons (*continued from page* 91), 126—Regulations for the Preparation and Sale of Methylated Spirit (*Abstract of the Act*, 18 *&* 19 *Vic., c.* 37), 138—The Chemical Establishment of the Excise, 140—Poisoning by Nitrate of Potassa, 140—Case of suspected slow Poisoning by Arsenic, 140—Poisoning by Lead—Stevens *v.* Barwell and Another, 141—*Review*, 143—*Books Received*, 143—*Correspondents*, 144.

No. IV.

Pharmaceutical Students and their Studies, 145—The Exhibition of the Products of Industry of all Nations—Paris, 147—The Patent Medicine Licence, 149.

Provincial Transactions: Liverpool Chemists' Association—Annual Report, 150—Manchester Pharmaceutical Association—Address of the Committee, 153.

Original and Extracted Articles: Practical Rules and Recipes in Electro-Deposition. Mr. Gore, 154—Supposed Aërolite found in Battersea Fields. Sir R. I. Murchison, 161—The Formation of Indigo-Blue. Mr. E. Schunck, 166—The Function of Salt in Agriculture. Mr. Northcote, 172—The Alcohol of Couch-Grass. M. Babourdin, 178—The Preparation of Artificial Oil of Cassia. M. Strecker, 180—The Artificial Production of Essence of Mustard. M. Berthelot, 180—Researches on Oxygen in a Nascent State. M. Houzeau, 181—The Constitution and Properties of Ozone. Dr. Andrews, 183—Preparation of Soluble Citrate of Magnesia. M. Robiquet, 184—The Gelatinization of Ether. M. Grunault, 184—New Filter, 185—Tannic Acid a Remedy for Chilblains. M. Berthold, 185—On the Crystalline Structure of Iron in Reference to the Nasmyth Gun, 185—Interesting Discoveries, 186—Charcoal as a Deoxidizer. Mr. Robbins, 186—The Position and Prospects of Dispensers in the Crimea. Mr. Brewer, 187—Statistics of Apothecaries and Druggists. Mr. Wilmott, 188—The Adulteration of Drugs, 189—Case of Suspected Poisoning by a Quack, 189—*Review:* Therapeutics, &c. Dr. Garrod, 191—*Books Received*, 192—*Correspondents*, 192.

No. V.

The List of Members and Associates of the Pharmaceutical Society, 193—The Transmission of Periodicals through the Post, 195—The Pereira Medal, 195.

Transactions of the Pharmaceutical Society: List of Members, Associates, and Apprentices (*continued*), 197—Pharmaceutical Meeting—Donations to the Library and Museum, 197—Patent Glass Float, 198—The Alleged Adulteration of Annatto, 198—Phytological Club—Notice, 201—North British Branch of the Pharmaceutical Society—Notice of Meeting and Lectures, 201.

Provincial Transactions: Liverpool Chemists' Association—Address of the President, 202—Manchester Pharmaceutical Association—Address of the President, 205—Distribution of Prizes, 206—Hewitt's Pulverizing Machine, 207.

Original and Extracted Articles: On a New Form of Gas Battery (*with cuts*). Mr. Symonds, 208—Rules and Recipes in Electro-Deposition (*continued*). Mr. Gore, 211—Manufacture of Yellow and Red Prussiates of Potash, Prussian Blue, Cyanide

of Potassium, &c., 219—The Production of Saffron in Kashmere, 226—On Sodium and its Manufacture. Mr. Beatson, 227—The Purification of Antimony. M. Lefort, 227—On the Solubility of Carbonate of Soda. M. H. Lœwel, 228—Nitro-Glycerine, or Glonoine. M. Vrij, 229.

British Association—Meeting at Glasgow: On the Metals of the Alkaline Earths. Dr. Matthiessen, 231—The Phosphorescence and Composition of Plate Sulphate of Potash. Prof. Penny, 231—A New Form of Cyanic Acid. Baron Liebig, 231—Process for obtaining Lithographs by Photography. Prof. Ramsey, 232—Alloys of Iron and Aluminium. Prof. Calvert, 232—The Titaniferous Iron of the Mersey Shore. Dr. Edwards, 232—The Chemistry of the Adulteration of Food. Dr. Hassall, 233—Process for Obtaining and Purifying Glycerine. Mr. G. F. Wilson, 233—On the Composition of Bread. Dr. Maclagan, 236—On Papyrus, Bonapartea, and other Plants yielding Fibre for Paper. Chev. de Claussen, 236—Hancornia Speciosa, Artificial Gutta Percha, and India Rubber. Chev. de Claussen, 237—The Use of Algæ and other Plants in Soap. Chev. de Claussen, 238.

The Sale of Methylated Spirit. Correspondence, 238—Nascent Oxygen, 239—Oleum Morrhuæ cum Quina, 239—*Books Received*, 240—*Correspondents*, 240.

No. VI.

The Responsibility of the Pharmaceutical Society under the Pharmacy Act, 15 & 16 Vict., cap. 56, 241—Pharmacy in the Crimea, 242—Adulteration and the *Lancet*, 243.

Transactions of the Pharmaceutical Society: Meeting of the Council—Correspondence, 245—Pharmaceutical Meeting, 245—Donations to the Library and Museum, 245—Distribution of Prizes, 246—Questions for the Examinations in Chemistry, Pharmacy, Botany, and Materia Medica, 246—The Adulteration of Drugs, 248—The Adulteration of Annatto, 254—Phytological Club—Meeting, 254—North British Branch of the Pharmaceutical Society—Meeting: President's Address, 254—Address of Dr. Maclagan, 256.

Provincial Transactions: Liverpool Chemists' Association—Meetings, 262—The Useful Products of the Natural Order Palmaceæ. Mr. Archer, 263—Manchester Pharmaceutical Association—Meeting, 265.

Original and Extracted Articles: Notes on the Materia Medica of the Paris Exhibition, 1855, 267—Notes on the Chemicals in the Paris Exhibition, 1855, 270—Note on Canadian Isinglass. Professor Owen, 273—The Natural Mineral Waters of Algeria, Sir J. F. Oliffe, 273—Tincture Press (*cut*). M. Weber, 273—Practical Rules and Recipes in Electro-Deposition. Mr. Gore, 274—Tribasic Phosphate of Soda. Mr. Groves, 275—Scale of Medicines and Medical Stores, 276—The Manufacture of Yellow and Red Prussiate of Potash, Prussian Blue, Cyanide of Potassium, &c. (*continued*), 278—Metamorphosis of Saccharine Matter—Experimental Inquiry. Dr. Pavy, 283—Sulphate of Magnesia as a Substitute for Sulphuric Acid, 285—Potassio-Tartrate of Antimony in Solution—Decomposition, &c., 286—Detection of Adulterations of Coffee and Chicory, 286—The Plate Licence, 287—The Scale of Medicines and Medical Stores, 287—The Early Closing Movement, 287—*Books Received*, 288—*Correspondents*, 288.

No. VII.

Criminal Poisoning, 289—The Slow Poisoning Case at Burdon, 290—Analysis of the Sanitary Commission, 292.

Transactions of the Pharmaceutical Society: List of Members, Associates, and Apprentices (*continued*), 294—Pharmaceutical Meeting—Donations to the Library and Museum, 294—On the Adulteration of Annatto. Dr. Hassall, 295—Phytological Club—Meeting, 310—North British Branch of the Pharmaceutical Society—Meeting, 310—Methylated Spirit and some of its Preparations. Mr. Macfarlan, 310—On Commercial Acetate of Lead. Mr. J. Mackay, 315—The Licence for using a Still, 316—Register Fund Prize Essay, 317.

Provincial Transactions: Liverpool Chemists' Association—Meeting, 317—Process for Purifying Water, and preventing Incrustation in Steam Boilers, &c. Mr. W. Dantec, 317—Manchester Pharmaceutical Association—Meeting, 319—On Sugar, its Pharmaceutical Use. Mr. Roberton, 319.

Original and Extracted Articles: On Wood-Oil, a Substitute for Copaiba. Mr. Hanbury, 321—The Reduction of Silver. Mr. Wiggin, 322—The Preparation of Blue Pill and Grey Powder. Mr. Stoddart, 322—Supplementary Remarks by Dr. Hassall, 323—The Detection of Alum in Bread. Mr. Postgate, 325—Case of Suspected Poisoning by Strychnia, 325—Ingenious Fraud, 327—Notes on the Chemicals of the Paris Exhibition, 1855, 328—Notes on the Materia Medica of the Paris Exhibition, 1855, 332—*Obituary:* Mr. W. A. Hallows, 335—*Books Received*, 335—*Correspondents*, 336.

No. VIII.

Professional Ethics, 337—Adulteration and Fraud, 338—Phytological Club—Annual Meeting, 340.

Provincial Transactions: Liverpool Chemists' Association—Meeting, 340—Photography applied to Pharmacy, 341.

Original and Extracted Articles: Notes on the Materia Medica of the Paris Exhibition, 1855, 342—On the Nutritive Properties of the Mass after the Expression of Nuts of Cocoa, &c. W. Hamilton, M.B., 350—On Vegetable Extracts. Mr. T. Southall, 350—The Use of Methylated Spirit. Mr. Wilkinson, 351—Large Dose of Antimony. Mr. Procter, 351—Hydrate of Baryta in softening Calcareous Waters. Mr. Durden, 352—On the Process for obtaining Oxygen. Mr. Hornsby, 352—On the Composition of Bank Note Slag. F. W. Griffin, Ph.D., 353—The Electrical Relations of Tin and Iron in various Liquids. G. Gore, Esq., 357—The Chemical Influence of Electricity, Heat, and Light. Professor Schönbein, 362—Some Phenomena of Contact Action. Professor Schönbein, 370—Preparation of Aluminium from Cryolite, H. Rose, 371—The Position of Aluminium in the Voltaic Series. C. Wheatstone, F.R.S., 373—The Preparation of Calomel in the Wet Way, 374—"Ol. Hyd. Gall.," 374—Method of Preventing the Incrustation of Boilers, 374—Pipitzahoic Acid, 375—Purification of Sulphuric Acid from Arsenic, 375—Note on the Testing of Sulphuric Acid, 376—On the Detection of Strychnia. Dr. Marshall Hall, 376—Poisoning by Essential Oil of Almonds, 377—Populin, 378—Royal Institution, 379—*Review:* Chemistry in its Application to Physiology and Therapeutics. Dr. Mialhe, 379—*Books Received*, 384—*Correspondents*, 384.

No. IX.

Limited Liability, 385—The Medical Bill for Session 1856, 387—Discussion on the Second Reading, 388—Professional Ethics, 389.

Transactions of the Pharmaceutical Society: List of Members, Associates, and Apprentices, 393—Meeting of the Council—Proposed Prizes, 393—Pharmaceutical Meeting—Donations to the Library and Museum, 394—The Diluted Mineral Acids of the Pharmacopœias. Mr. Squire, 394—Phytological Club—Meeting—Monstrosity in Papaver Bracteatum. Mr. Bentley, 398—North British Branch—Meeting—The Manufacture of Soap. Dr. S. Macadam, 400—Sweet Spirit of Nitre. Mr. Brown, 400—Meeting of the Board of Examiners, 405.

Provincial Transactions: Liverpool Chemists' Association—Meeting—The Natural History of Cinchona Bark, 405—Manchester Pharmaceutical Association—Meeting, 407.

Original and Extracted Articles: The Diluted Acids of the Pharmacopœia. Mr. Giles, 409—Notes on the Materia Medica of the Paris Exhibition. W. Hamilton, M.B., 410—On the Preparation of Oxygen. Mr. H. M. Witt, 411—The Electrical Relations of Lead and Antimony in various Conducting Liquids. Mr. Gore, 413—The Meteorology of the West of London. Mr. Copney, 415—Manufacture of Yellow and Red Prussiates of Potash, Prussian Blue, &c. (*continued*), 421—Reduction of the Metals by Hydrogen, 424—Bed of Nitrate of Potash in Pennsylvania, 424—Chemical History of the Fats. W. Heintz, 425—Preparation of Hydrocyanic Acid, 429—Molybdic Acid Test for Phosphoric Acid, 429—The Kumis and Raky of the Tartars, 429—Remedy for Hydrophobia, 430—A New Gun Cotton, 430—Death by Essential Oil of Almonds, 430—Indigenous Opium, 430—The Medicine Stamp, 431—Analysis of Bank Note Slag, 432—*Correspondents*, 432.

No. X.

The Registers of the Pharmaceutical Society, 433—The Prizes offered by the Council, 434—Poisoning, 436—Professional Ethics, 437—Physicians and Pharmaceutists, 438—The Adulteration of Food, Drugs, &c., 442.

Transactions of the Pharmaceutical Society: Financial Statement for the Year 1855, 446—List of Members, Associates, and Apprentices (*continued*), 447—Regulations for Prize Essay on Cerates, Ointments, and Plasters, 447—Prize Essay on the Structure of Starch Granule, 448—Botanical Prize for 1857, 448—Pharmaceutical Meeting—Donations to the Library and Museum, 449—On the Distinctive Characters of the Roots of Aconite and Horse-Radish (*with cuts*). Prof. Bentley, 449—The Construction and Management of Aquaria for Leeches. Mr. Allchin, 453—The Distilled Waters of the Pharmacopœia, 454—Phytological Club—Meeting, 456—North British Branch—Meeting, 457—On Pharmacy as a Branch of Technology. Dr. Wilson, 457—Preparation Jar (*with cut*), 463.

Provincial Transactions: Manchester Pharmaceutical Association—Meeting, 464—On Poisons. Mr. Wilkinson, 464.

Original and Extracted Articles: On Hermodactyls. Dr. J. E. Planchon, 465—On the Suggestion to substitute Aqua Lauro-Cerasi, &c., for Hydrocyanic Acid. Mr. Haselden, 468—On the Preparation of Oxygen. Mr. Brown, 469—Introduction of Cinchona into Java, 471—The Musk-Deer (*with cut*), 472—The Supply of Medicines to Merchant Vessels, 475—Medicated Cod-Liver Oil—Horsley's Patent, 475—On certain Magnetic Actions and Affections. Prof. Faraday, 476—Accidental Poisoning by Aconite, 477—Murder and Suicide by Chloroform, 478—Poisoning by Strychnia, 478—Use of the Microscope against Thieves, 478—Action against a Bone-Setter, 479—*Books Received*, 479—*Correspondents*, 480—Errata, 480.

No. XI.

Medical Legislation, 481—On the Medical Bill, 482—Annoyance Juries, 484—Illegal Weights, 485.

Transactions of the Pharmaceutical Society: List of Members, Associates, and Apprentices (*continued*), 486—Pharmaceutical Meeting—Pure Oxide of Zinc, 486—The Diluted Acids and Alkalies of the Pharmacopœia. Mr. F. Kendall, 490—Phytological Club, 492—North British Branch of the Society—Pharmaceutical Meeting, 492—Apparatus for taking Specific Gravities, 493—Address of the President, 494—Annual Meeting, 496—Report and Financial Statement, 497—Annual Dinner, 498.

Provincial Transactions: Liverpool Chemists' Association—Meeting, 498—The Chemical Constituents of Cinchona Barks. Mr. H. S. Evans, 499.

Original and Extracted Articles: On Hermodactyls. Dr. J. E. Planchon, 500—On the Preparation of Oxygen. Mr. H. M. Witt, 503—Test for Carbonate and Iodate of Potash in Iodide of Potassium. Mr. W. Copney, 504—The Position of Aluminium in the Thermo-electric Scale. Mr. G. Gore, 506—Trade Pharmacy. Mr. Joseph Ince, 507—The Manufacture of Yellow and Red Prussiates of Potash, Prussian Blue, Cyanide of Potassium, &c. (*continued*), 511—Chemical Influence of Electricity, Heat, and Light. C. F. Schönbein, 513—Application of Sulphuret of Carbon, 517—Valuation of Chloride of Lime by Means of Sulphate of Iron, 518—Neutral Nitrate of Mercury, 518—The Mammoth Tree of California, 519—Alcohol from the Fruit of the Cactus, 519—Glycerine Jelly, 519—Note on the case of Poisoning by Aconite, 520—Test for Strychnine, 520—Select Committee on the Adulteration of Food, Drugs, &c., 520—Druggists' Early Closing Association, Glasgow, 527—*Books Received*, 527—*Correspondents*, 527.

No. XII.

Illegal Weights, 529—Passing Events—The Close of the Fifteenth Volume—The Anniversary of the Society—The Adulteration of Food and Drugs—Testimonial to Dr. Hassall—Palmer's Trial, 531.

Transactions of the Pharmaceutical Society: Conversazione, 535—Fifteenth Anni-

versary of the Pharmaceutical Society, 536—Address of the President, 536—Report of the Council, 538—Adjourned Meeting, 543—Council and Auditors for the ensuing Year, 544—Phytological Club—Meeting, 492.

Provincial Transactions: Liverpool Chemists' Association, 498—Chemistry in its Relation to other Sciences. Mr. G. Hamilton, 545—The Useful Products of the Graminaceæ. Mr. T. C. Archer, 548—Manchester Pharmaceutical Association—Annual Meeting and Report, 549.

Original and Extracted Articles: Latest from the Crimea. Mr. Ince, 551—Purification of Water supplied to Towns, &c., 558—Concentration. Mr. Haselden, 558—The Mercury of New Almaden, California, 558—Conditions of Success, and Causes of Failure in Photography, 560—Remarks on Silicum, 561—The Flame of Bisulphate of Carbon, 563—Internal Administration of Chloroform, 563—Employment of Hyposulphite of Soda in Analytical Chemistry, 564—The Starch of Fritillaria Imperialis, 564—Syrupus Ferri Iodidi. Mr. Houlton, 564—On the Preventing of the Oxidation of Metals. Mr. Draper, 564—Adulteration of Food, Drugs, &c., 565—Sheep Ointment. Wills *v.* Towers, 567—*Books Received*, 568—*Correspondents*, 568.

THE PHARMACEUTICAL JOURNAL.

VOL. XV.—No. I.—JULY 1st, 1855.

PHARMACEUTICAL JURISPRUDENCE.

Our present number contains reports of three legal decisions affecting the Pharmaceutical interest. The first is the Judgment in the Court of Exchequer Chamber (page 5).

The second is a case in which a Chemist and Druggist sought to recover payment for medicine administered by him to a patient (page 45). A portion of the remedies so administered were supplied by the plaintiff in the capacity of dentist, and the remainder were prescribed by him after examination of the patient in the back parlour and dispensed in the shop. The defence rested on the 55th Geo. III., cap. 194, by which a person not duly qualified to practice as an Apothecary is precluded from the recovery of payment for medicines so supplied. The judgment of the Judge affords evidence of very careful consideration, the decision being made to depend on the capacity in which the articles were supplied, and the distinction between the functions of the Apothecary, the Dentist, and the Chemist, is pointed out in a manner so much to the purpose that we have quoted the judgment in *extenso* for future reference. While conceding to the Chemist that latitude of discretion which we have always claimed, and the extent of which "in each case must depend on its own circumstances," the Judge very properly draws a distinction between such cases and that of a person who takes his patients into his consulting room, examines their symptoms, prescribes, and furnishes the medicine. If the question at issue had been the recovery of a penalty under the 55th Geo. III., cap. 194, for illegally practising as an Apothecary, it would have been more serious in its result, as no conviction has hitherto taken place against a Chemist for administering medicine in his own shop, and it would be wise to take the case before us as a warning, and not to try to what extent the spirit of the Apothecaries' Act may be evaded with impunity by the establishment of a "consulting-room," and the supply of medicine with advice.

In a recent case, the Apothecaries' Company *versus* Brownridge, it was alleged by the defendant that it was the regular custom in Hull for Chemists to visit patients and to prescribe *ad libitum*. This we are informed on good authority is not true. There may be a few isolated cases, but they are exceptions and not the rule, and the more respectable Pharmaceutists repudiate the aspersion.

The other case reported in this number is a prosecution under an Excise information. The offence consisted in a guilty knowledge of the fact that the articles sold to a publican were purchased for an illegal purpose (page 47). In fact the vendor recommended the drugs sold, for the purpose of adulteration. Our report of the case is very much condensed, but it is sufficiently detailed to show the principle on which the law is based, and the mode of avoiding the unpleasant consequences of an infringement. A person convicted under this law deserves no sympathy, as it is necessary, to ensure conviction, to prove not only that he sold the drugs, but that he knew or believed the purchaser to be a licensed brewer, or a retailer of beer, &c.

While the efforts of the Pharmaceutical Society are directed to the improvement and elevation of the *status* of Pharmaceutical Chemists and the protection of their general interests, it is no less a duty to the public than a necessary condition in the attainment of success to discountenance evasions of the law or other disreputable practices which might bring disgrace on the Society.

The "protection of the general interests," consists, not in the defence or extenuation of any irregularity on the part of individuals, but in a due observance of the laws framed for the general good, and in procuring the amendment of such as may be found to operate harshly or unjustly. When doubts exist as to the correct interpretation of a law, or the extent to which indulgence is granted under especial circumstances (as for examples, in the case of the Medicine Stamp Acts, the law respecting the Sale of Spirit of Wine, &c.) it is important to obtain and circulate information on the subject, with a clear explanation of the questions at issue on official authority. When this is done, and all the parties concerned are in possession of the requisite knowledge respecting the actual state and interpretation of the law, each individual has it in his power to escape the annoyance or injury consequent upon infraction. If there be still some point not clearly defined in legal terms, some discretionary power the object and extent of which may be readily understood by an appeal to common sense, though not so easily expressed in words, then the general interest demands that the *power* so granted shall be exercised with *discretion,* and in accordance with the spirit and intention of the legislature.

Those who take advantage of any apparent laxity in the restrictive operation of a law, and exert their utmost ingenuity, while keeping within the letter, to violate its spirit and intention, are not advancing the interest of the class to which they belong. On the contrary, they may unintentionally produce an effect directly opposite from that which they desire, by affording practical proof that the law is not sufficiently stringent, and thus giving a pretext for the introduction of one which may be less easily evaded. For example, we have frequently had occasion to resist the attempts which have been made to define the limits between the functions of the Apothecary and those of the Pharmaceutist, in such a manner as to be injurious to the latter class; and it is now generally admitted, that some discretionary power must be conceded to the public, as well as to the members of our own body, in determining where the line shall be drawn. The Pharmaceutical interest is concerned in proving that the confidence thus reposed in its members is not misplaced, and that no further restrictions are necessary. Those Chemists who endeavour to sail as near the wind as possible, who have "*consulting rooms,*" who "*prescribe gratis,*" and (whether on their own premises or not) *perform all the functions of medical men*, are not the friends of their class. They may be compared to schoolboys, who are allowed to walk through an orchard with the understanding that they may take a few windfalls from the ground; but not satisfied with this privilege, some of them take advantage of the opporrunity to strip the trees, and thus cause the door of the orchard in future to be closed against their companions and themselves, or only opened under much more strict regulations.

The open violation of the law by the sale of drugs for illegal purposes, or to persons who by law are not allowed to have such articles in their possession, is much to be regretted, and admits of no extenuation. It is also especially incumbent upon us at the present time to promote and inculcate a conscientious observance of the existing laws relating to the Excise, having evidence before us of a disposition on the part of the Legislature to grant every possible indulgence to those engaged in commercial and manufacturing persuits, by a remission of the duty of spirit under regulations detailed in the report of which we publish the concluding portion in this number.

In another part of this number will be found an abstract of the recent regulations respecting the transmission of periodicals and books by post, which may possibly lead to some alteration in the arangements for sending this Journal to the Members; but the regulations having scarcely come into operation, we postpone any further observations on the subject until next month.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL, *June 6th*,
being the First Meeting after the Anniversary, the following officers of the Society were elected :—

MR. JOHN T. DAVENPORT .....*President.*
MR. GEORGE WAUGH .....*Vice-President.*
MR. DANIEL BELL HANBURY .....*Treasurer.*
MR. GEORGE W. SMITH was also re-appointed *Secretary and Registrar.*

AT A SPECIAL MEETING OF THE COUNCIL, *June 14th*,
MR. DAVENPORT, PRESIDENT, IN THE CHAIR.

The resignation of the office of Vice-President by Mr. Waugh having been read, MR. GEORGE EDWARDS (Dartford) was elected *Vice-President.*

LIST OF MEMBERS, ASSOCIATES, AND APPRENTICES (*continued*).

MEMBERS.

BRISTOL .....Lavington, Edwin
BROMLEY .....Baxter, William Walmisley
DURHAM .....Robinson, Ralph
GATESHEAD .....Howson, Thomas John
HAMMERSMITH .....Salter, John Edward
ISLINGTON .....Mitchell, John
LONDON .....Mould, Samuel
Oldfield, Henry
MANCHESTER .....Botham, William
NOTTING HILL .....Biggs, Walter
PENRITH .....Wilson, Joseph
PERTH .....Dandie, Robert
PETERBORO' .....Sturton, Richard
PLYMOUTH .....Balkwill, Frederick Prior
PORTSEA .....Perfect, George
WAKEFIELD .....Handley, John

MAJOR EXAMINATIONS.

Amos, Daniel .....Canterbury
Baissac, Pierre Joseph .....Mauritius
Beach, James .....Bridport
Gibbons, George .....Clifton
Hopwood, Thomas Smith ...Richmond
Jessop, John .....Clapham
Lingwood, Jas. Grace .....Gt. Yarmouth
Noel, Ferdinand.....Mauritius
Rayner, William.....Canterbury
Taplin, Frederick .....Bristol

MINOR EXAMINATIONS.

Brady, Henry Bowman .....Leeds
Johnson, Joseph .....London
Lloyd, David Llewelyn .....Carnarvon
Richards, Charles .....Weymouth
Smith, Thomas James .....Grantham
Stevens, Joseph Gregory ...Guildford

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	TOWNS.
Fletcher, John	Mr. Henson	Camberwell
Green, Conrad	Mr. Kendall	Stratford-on-Avon
Gregory, Richard	Mr. Lavers	London
Goodwyn, Charles S.	Mr. Chapman	Ipswich
Lamplough, John	Mr. Stevenson	Derby
Madgwick, William B.	Mr. Huggins	Alresford
Scarlin, James Henry	Mr. Marchant	Ipswich
Teed, David	Mr. Pasmore	Exeter
Underdown, Frederick W.	Mr. Hall	Canterbury

PHARMACEUTICAL MEETING,

On Wednesday, June 6th, 1855,

MR. J. T. DAVENPORT, PRESIDENT, IN THE CHAIR.

The following Donations to the Library and Museum were announced:—

The Journal of the Society of Arts, from the Society of Arts.
The Journal of the Photographic Society, from the Photographic Society.
The Literary Gazette, from the Publishers.
The Chemist, from the Publishers.
Specimens of the Bark and Fruit of the Greenheart Tree, from Mr. C. McCulloch.
Specimen of the Ordeal Bean of Old Calabar, from Dr. Christison.
North American Sarsaparilla (*Aralia nudicaulis*), from Mr. Daniel Hanbury.
Specimen of Torbane Hill Mineral, from Mr. W. G. Carr.
Four specimens of Pigments prepared from Antimony, from Messrs. Steiner and Gatty, of Accrington.
Specimen of Ammonio-sulphate of Iron (Iron Alum), from the President.
Specimens of Crystallized Palmitic Acid and Pure Glycerine, from Price's Candle Company. Presented through Charles Tomlinson, Esq.

Mr. Redwood remarked, that the samples of palmitic acid and glycerine just announced as donations, were prepared by the process recently adopted by Price's Candle Company. The glycerine, which was perfectly colourless and very pure, was obtained in that state by distillation.

The Chairman thought it an interesting fact, that a substance, such as glycerine, which is not usually considered volatile, should be obtained by distillation.

Mr. Pedler had been given to understand, that the process by which this glycerine was obtained was essentially that which had been originally patented in America, and which consisted in passing the fats mixed with water through a long iron tube kept at a high temperature.

Mr. Redwood explained that there were two processes which had been recently patented for the decomposition of fats. One of these, namely, that to which Mr. Pedler had referred, was the invention of an ingenious American, Mr. Tilghman, and consisted in mixing the fat to be decomposed with about half its bulk of water, so as to form a sort of emulsion, and then forcing the mixture under pressure through a long iron tube heated to a temperature of 500° or 600° Fah. In passing through the tube the fat was decomposed, and the fatty acids, together with an aqueous solution of glycerine, flowed out at the extremity of the tube. This process had been patented in this country as well as in America. The other process referred to was that of Mr. Wilson, who was one of the patentees of the process which for several years had been worked by Price's Candle Company. Hitherto that Company had prepared the fatty acids of which their composition candles were made, by treating the fats, in the first instance, with sulphuric acid at an elevated temperature. A decomposition of the fat was thus effected, the glycerine was decomposed, and it appeared that some of the fatty acids were also destroyed by the action of the acid. From the blackened product of this first step in the process, the fatty acids were distilled by passing super-heated steam through the mixture. Within the last few months, and since the publication of Mr. Tilghman's process, Mr. Wilson had patented a new process, in which the use of sulphuric acid was omitted, the fats being decomposed and the products distilled, by passing super-heated steam through the vessel containing them. This was the process by which the specimens under notice were produced. Mr. Wilson's recently patented process and that of Mr. Tilghman differed in some essential points. Thus, in Mr. Tilghman's process all the ingredients remained throughout the process in the liquid state, and the quantity of water required for decomposing the fat, and consequently the amount of heat consumed, was comparatively small. In Mr. Wilson's process the water was used in the state of super-heated steam,

and the quantity of this required to effect the object was very considerable. In Mr. Tilghman's process the products of the decomposition of the fat (the fatty acids and glycerine) flowed from the orifice of the tube in an impure state, all the impurities originally present in the fat being mixed with them. In Mr. Wilson's process the fatty acids and the glycerine were not only separated, but were volatilized with the steam, and were subsequently condensed in separate parts of the apparatus in a state of great purity. Each process appeared to possess certain advantages. Mr. Tilghman's effected the decomposition of a given quantity of fat with the smallest expenditure of heat, but it left the products in an unpurified state. Mr. Wilson's, on the other hand, yielded pure products, but it involved the use of large quantities of steam. He believed these were the points in reference to which the comparative merits of these competing processes would have to be tested by practical trial.

The PRESIDENT then stated that as the Judgment in the case of Dickinson *versus* The Pharmaceutical Society, in the Court of Exchequer Chamber, had not been pronounced in time for insertion in the Transactions for the present month, it had been thought desirable to give the Members the earliest information on the subject, by reading the Judgment at that meeting. He hoped this would be interesting and satisfactory to the Members, and that the question in dispute being finally settled, the business of the Society would henceforth proceed without interruption.

In Error. COURT OF EXCHEQUER CHAMBER,

30*th May*, 1855.

PRESENT.—Lord Chief Justice Jervis, The Lord Chief Baron, Mr. Baron Alderson, Mr. Justice Maule, Mr. Justice Cresswell, Mr. Baron Platt, Mr. Baron Martin, and Mr. Justice Crowder.

THE QUEEN, *v.* THE REGISTRAR OF THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.

JUDGMENT.

Transcript from the Shorthand Notes of Messrs. Hodges and Son, 99, Chancery Lane.

Lord Chief Justice Jervis.—I am of opinion, in this case, that the Judgment ought to be affirmed. I have entertained, in the course of the argument, considerable doubt whether the mandamus was properly directed; and if I had not arrived at the conclusion that the Court of Queen's Bench was right upon the other point, it would have been necessary for me to have entered, at some length, into the point as to the form of the *mandamus*, and the party to whom it was directed, with the view of seeing whether the proper remedy had been pursued. But although I have entertained considerable doubt upon that point, and, indeed, great doubt upon the main point during the course of the argument, I am not ashamed to say that I have formed an opinion more than once upon both sides of the question; yet, upon the fullest consideration that I have been able to give to the case, and availing myself of the interval which has occurred, and giving due weight to everything that has been urged by the other side, the result is, that upon the very difficult construction, I must be forgiven for saying, of a somewhat obscure Act of Parliament, I am of opinion that the parties are entitled to be upon the register, and that the judgment of the Court of Queen's Bench is correct. In pronouncing my opinion, as shortly as I can, I beg it to be understood that I alone am responsible for the reasons that I deliver for that judgment. My learned brethren will deliver their judgments at length; but I believe now that they all concur in the general result of the case.

In reading the Preamble of the Statute I think we might fairly have expected to find some provision requiring an examination as a qualification to be put upon the register—upon reading the Preamble, and the Preamble only; but, on

looking to the Act of Parliament, I do not find that the Statute does provide for that, and for that only. When I find by the 1st section that the Charter is to remain in full force, and the Bye-laws, unless by the Act of Parliament altered, varied, or repealed—and I do not find by the Statute that it is expressly altered, varied, or repealed—I must take for granted that the Legislature intended that the qualifications for being Members of the Society, as they existed by the Charter, should continue, notwithstanding the passing of the Act. We, therefore, have the case in this Statute, of a number of persons associating themselves together, who assume the name of Members of the Pharmaceutical Society, with various—say four—qualifications. It is desirable that persons who benefit from the use of that name should be prevented from using that name improperly; and when I find that the Act of Parliament does not require examination in all cases, I am bound to inquire why the Act of Parliament passed, and what was the motive of the Preamble? I can explain it in this way, that whereas the parties applied to the Legislature for penalties to prevent the use of the name, in order that they might not be met by the statement, "You are a self-elected body, and you remain so; you may prohibit competent persons from using this qualification"—they meet that by saying, all persons who ought to be permitted to use it shall be permitted to use it, because we will tender to the public a full and free examination of their qualifications, and, if they pass that ordeal, they may be entitled to use the name of Pharmaceutists or Pharmaceutical Chemists.

That may explain possibly, but it does not satisfactorily explain the terms to be found in the Preamble. The Preamble states, that it being desirable that persons should be examined and qualified, and that a register should be kept. The Act then proceeds to make provisions for the maintenance of that register. The Registrar, an officer, is appointed by the 4th section, who is removable by the Council, and acts under their control. The 5th section says that that Registrar shall, from time to time, make and maintain a complete register of all persons being Members of the Society, and also persons who being Associates, and Apprentices or Students respectively, according to the terms of the Charter, and further registers and books if required by the Council. The Charter, as I read it, makes no provision for maintaining or keeping a register at all; but this Statute says that a register shall be kept. Then you look to the 6th and 10th sections for the purpose of ascertaining how that register is to be kept. The register is to be, in the first instance, under the 6th section, of all persons who at the commencement of the making of the register, and at the time of the passing of the Act, are Members, Apprentices, or Students. They are the first persons to be put on the register, and they are to be entered as Pharmaceutical Chemists, Assistants, and Apprentices or Students, in connexion with that department: that gives the form, or heading, or substance of that register. In the 10th section, provision having been made intermediately and incorrectly, because perhaps, properly speaking, the 10th section should have followed the 6th, as showing the class of persons to be registered, they interpose a qualification by the 8th and 9th sections, the examination clauses, and then say that persons who have passed the examination, and have obtained a certificate, shall be entitled to be registered according to the provisions of this Act; that is, the register which is provided for by the Act, which is to be made under the 5th section, of the Members for the time being, and which is to be begun, under the 6th section, of those who are Members at the time of the passing of the Act; and it further adds, which raises the difficulty on the other side—that those persons, when once they are entitled to be registered as Chemists, shall be eligible to become Members. Then it is said, "If they are to be eligible as Members, how are you to ascertain whether they be Members or not Members? And you must have a double register for that purpose." Why, they are to be Members as they were before under the Charter—Members of the Society; and the same provision, and the same Charter, and the same knowledge of the

officers which enabled them to ascertain who were Members formerly, will enable them still to ascertain who are Members after they have been eligible as elected, that, being once Members, then they become chemists.

That is further illustrated or shown by some sections of the Act of Parliament, to which I will shortly refer. The principal object is to protect the public from imposition by quacks, and you ask the Registrar, under the 7th section, a question, "Is he a Pharmaceutical Chemist?" If he is on the register—is he registered as a Pharmaceutical Chemist? Is he on that register? The Registrar may say "yes," or "no." You do not ask whether he is on the register as a Member, but "is he a Member?" That is, because a man may be a Chemist, and on the register as a Chemist, and not a Member. When once you ask that question whether he is a Member, then you ascertain, as a matter of fact, from the provisions of the Statute, that to be a Member he must of necessity be a Chemist. If it were not so, the hardship would follow, and part of the absurdity which was adverted to by Mr. Bramwell. In construing the Act of Parliament we must put a reasonable construction on it, so as to avoid the absurdity at which we should otherwise arrive. By the 12th section, if Sir Fitzroy Kelly's argument is well founded, a man may be a Chemist, and may be a Member of the Society. If he is a Member of the Society he has no right to say so unless he be a Chemist. That certainly is a great absurdity, because the Statute talks of the Members of the Society who are to be entered on the register, and reserves the rights of the Members, and says the first Members are to be Chemists; yet it goes on to say, in the 12th section, that although a man may be a Member, he shall not use that term. The only way of reconciling that, is to suppose that the Legislature thought it was so important that the public should not in any way be imposed upon, that they would not allow a man to have any connexion with the Society who was not an examined Chemist. I think that is not the fair construction of the Statute. If the Statute, as Sir Fitzroy Kelly said it was intended, requires that there shall be two classes only, both those who were Members at the passing of the Act, and those who have been examined afterwards, I can understand it. Although that possibly might have been the intention, that intention has not been carried into effect by the provisions of the Act, because the Charter is to continue in force, unless altered, repealed, or varied. There are no words in the Statute that alter, repeal, or vary the Charter. I think it would be too much to take away the vested rights of parties merely upon a forced construction of a penal section of the Act.

Upon these grounds—many others might be urged if it were necessary to go into them, but it is not necessary when the Judgment of the Court below is affirmed, to enter at great length into the question—for these short reasons I am of opinion that the Judgment of the Court of Queen's Bench is right, and ought to be affirmed.

The Lord Chief Baron.—I entirely agree with my Lord Chief Justice, that the Judgment of the Court of Queen's Bench ought to be affirmed. The *mandamus* is directed to the Registrar, to keep and to maintain a register. It is suggested that he has not done so, because he has admitted on the register the names of three persons who are stated in the Writ, namely, William Murdoch, John Abraham, and John Wright; and the practical question in this case is, whether the names of those three persons ought to remain on the register or not? I am of opinion that their names ought to remain on the register.

The point made by Sir Fitzroy Kelly, and which really is the substantial question argued before us, and which we have mainly to consider, is this:—On the part of the appellant it is contended that there are no Members subsequent to a certain date. They say there is to be no feeding of the Society with new Members, except by those persons who have been examined under the 8th section, registered under the 10th, and subsequently elected; and that no other persons, except those who have got into the Society in that way, are

entitled to be considered as Members, or to be put upon the list or register of Pharmaceutical Chemists. I cannot adopt that construction of the Act, and for this reason—the Charter gave various means—I think there are no less than four classes of persons who may become Members of the Society. The Preamble to the Act expressly recites, I believe, all the modes; certainly it recites the one in question, and therefore the only one I need advert to—namely, "Chemists and Druggists who were or had been established on their own account before, or at the date of the Charter, or who should have been examined in such manner as the Council of the Society should deem proper, or should have been certified to be duly qualified for admission." Now this is expressly recited in the Preamble. The second section professes to confirm the Charter, and, unless in the manner as thereby altered, varied, or repealed, it leaves it in full force and virtue. After that, having recited this very mode of a party becoming a Member, and confirming the Charter except as repealed, and then not certainly expressly repealed, I am of opinion, on the true construction of such a Charter and Act of Parliament as these are, that whatever is not expressly altered is confirmed; and as there are no expressions which take away the right of the Council to admit in the manner given by the Charter, and recited in the Preamble of the Act, I am of opinion that that manner of admitting Members remains in full force. It sufficiently appears in the Judgment of the Court of Queen's Bench that the three individuals in question—William Murdoch, John Abraham, and John Wright—were, but for the construction of the Act of Parliament contended for by Sir Fitzroy Kelly, duly admitted.

No doubt it has been contended that there ought to be two registers. Although there would be no objection that I am aware of to the Registrar keeping a separate list of those who were Members, and another list of those who were merely Pharmaceutical Chemists—and that there may be Pharmaceutical Chemists, and not Members, would abundantly appear from the 10th section, where persons who are upon the list or register as Pharmaceutical Chemists, are made eligible to be Members—yet I very much doubt whether the Act requires more than one list; for in the Preamble, referring to that again as the key to the Statute, I find the two classes—that of Pharmaceutical Chemists and Members of the Society—are mentioned together. They are both mentioned in the same passage, and it is said that it would be right that there should be a register kept of both. Now this is the language of that part of the Preamble :—"And whereas it is expedient to prevent ignorant and incompetent persons from assuming the title of or pretending to be Pharmaceutical Chemists or Pharmaceutists in Great Britain, or Members of the said Pharmaceutical Society"—putting them both together in the same category:—"and to that end it is desirable that all persons, before assuming such title, should be duly examined as to their skill and knowledge by competent persons, and that a register should be kept by some legally authorized officer of all such persons." That is, a register is to be kept of Pharmaceutical Chemists and of Members of the Society. I do not know but that the object which the Act had in view would be abundantly answered by having one register. There is no objection, however, if it be a more convenient thing to the officer or Council to have two; and the remark made by my Lord Chief Justice, I think, very much indeed confirms this, that when you inquire about a Pharmaceutical Chemist, you ask whether the person, whose name and address is given, appears in the register. That is the question you put with reference to that; but with regard to the other—whether he is a Member or not—all you ask is, "Is he a Member or not?" You do not ask whether he is registered as a Member, but whether he is a Member or not. Looking, therefore, at the object of this *mandamus*, namely, to remove these persons from the register, I am of opinion that they are properly placed there—that they have been admitted as Members; and I cannot help thinking that the Act apparently takes it for granted that

every Member is a Pharmaceutical Chemist and Member of the Society. The Society is composed of Pharmaceutical Chemists. All who are Members are Pharmaceutical Chemists. There is a short passage in the judgment below which intimates that the Pharmaceutical Chemists seem to be the larger body, of whom the Members, at all events, are a part. I am of opinion, therefore, that these persons being Members, as I think they were, of the body, are properly put upon this register, and that therefore the Judgment of the Court below ought to be affirmed.

Mr. Baron Alderson.—If we take the 12th section alone, and construe it literally, it prescribes that every person not registered as a Pharmaceutical Chemist, shall be prohibited from assuming or using the title of a Pharmaceutical Chemist, or to assume, or use, or exhibit any name, title, or sign, implying that he is a Member of the Society. Now, that would be the difficulty—if a person can be a Member of the Society without being registered as a Pharmaceutical Chemist, it leads to this absurdity, that the Legislature is supposed to have enacted that a person is not to call himself what he really is. Well, then, that difficulty is got rid of in two ways. Sir Fitzroy Kelly says, that the true implication from that is, that all persons who are to be registered as Pharmaceutical Chemists, shall consist of two classes; first, those who were Members of the Society at the time when the Act passed, who are to be registered under the 6th section, and those under the 10th section, who having been examined, have passed as Pharmaceutical Chemists. No doubt that gets rid of the absurdity which I point out in the first instance; but it gets rid of it at this expense, by apparently violating the whole scope and meaning of the Act of Parliament, which never intended to take away any of the privileges of the Pharmaceutical Society which they had before the Act passed, but to leave them, except where expressly altered, as they were before. I do not think that that, therefore, ought to be adopted as a way to get rid of the absurdity.

Then another way has been suggested, which seems to me free from all difficulty, that is, that the Registrar is to make a register of all the Members of the Society, according to the 5th section, in which no form in which they are to be registered is prescribed, and that the 6th section is to be read as ordering the registration of the original Members, and prescribing the form of the register in future for all: that seems to me to get rid of the absurdity, and to get rid of it at less expense than violating the whole scope and meaning of the Act. I adopt that, and if the result be so, the Judgment of the Court of Queen's Bench is right.

Mr. Justice Maule.—I am of opinion that the Judgment of the Court of Queen's Bench is right, and the ground of my opinion is very shortly this: I shall not enter into the details of the arguments, or meet every difficulty that has been suggested. The Charter was granted in the year 1843, to a certain number of persons who proposed to be incorporated for a purpose suggested to be beneficial to the public. The Crown granted a Charter, reposing considerable confidence in those persons, and expected that those persons who were named originally, and who afterwards became, under the powers granted by the Charter, Members of the Society, and thereby became incorporated, that those persons were persons of competent skill, and worthy of being trusted with the powers granted them by the Charter. They, under that Charter, had the power of electing and admitting Members who should be Chemists and Druggists, according to certain modes of inquiry into their fitness, which are mentioned in the Act of Parliament, and by means of the election by the Council upon such inquiry of such persons: that was one of the franchises granted to this Society. Nine years afterwards, an Act of Parliament passed, of which the main object was to prevent persons from calling themselves Members of the Society who really were not, under some penalty, and further, from preventing persons calling themselves Pharmaceutical Chemists who were so, which certainly is taking away a common law right from a multitude of people.

Pharmaceutical Chemist was not a name that was very popularly known or adopted before this Society was incorporated, and so a person calling himself a Pharmaceutical Chemist after the Society was incorporated, might, and I apprehend would be, no doubt by the great majority of his customers, supposed to be a Member of that Society. Now to prevent persons doing that, if they were not qualified, and to allow them to do it, notwithstanding the privileges of the Society if they were qualified, was the main object of this Act of Parliament. But there is no suggestion anywhere in the Act of Parliament that during the nine years that the Society had exercised the power and trust confided to them by the Crown, that they had at all misconducted themselves in that respect, that they had shown the least unfitness for determining who should be admitted Members of the Society, and to be admitted into the high class of Pharmaceutical Chemists which the Society were assumed to be, and the Crown enabled and intended them to assume to be. The Council of the corporation under the Act had that power granted to them which had been exercised for nine years. There is no suggestion that they were unworthy of it, and if they were, they had the power of electing the Council, by certain means pointed out by the Act, which they might vary in some respects by Bye-laws, and one of their highest franchises was, that they might by that means elect Members. There is not a word in the Act to take away that power. Throughout the whole Act it is not said that in future no election shall take place under the Bye-laws, or of a Member who has not been examined. There is nothing to deprive the Society of the power which it unquestionably had under the Charter, of electing without the condition of the special kind of examination pointed out in section 8 of this Act of Parliament. You must, therefore, by implication, take away those powers from the Society, or deprive the Society of its franchise, without a word of negation or a word of deprivation in the Act at all.

The ground of the argument in favour of the *mandamus* is, that the Act of Parliament has certain provisions with respect to registration, and with respect to forfeitures, which provisions are not congruous with the corporation retaining its franchises unshorn and undiminished by the Act of Parliament. If that were so—assuming that to be so—it seems to me that those clauses ought not to govern, that it is not because certain clauses with regard to the detail of the registration may be incongruous with the substance of the powers granted by the Charter, which are expressly said to be repealed, that you ought, therefore, to say that those powers are to be considered as taken away, when there are no apt words to do it at all, or to say that the Society shall be deprived of anything, when there is nothing to deprive them of at all.

Now if one set of provisions, namely, the provisions of detail about examination, were incongruous, and not agreeable to the general scope of the Act, and the expressed intention of the Legislature, that the existing franchise should be maintained undiminished, the proper way would be, I apprehend, to make the clauses with respect to registration and forfeiture, subordinate to the clauses which grant and confirm the rights of the corporation then existing under the Charter, and as exercising the same for nine years. You should consider those provisions which I have last mentioned as the predominant ones, and the others to be subject to be construed with reference to them. I say subordinate, because in a subordinate manner to the clauses which are at the beginning of the Act, which are conservative of the powers granted to the corporation by the Charter. I do not say myself that there is that incongruity. I am disposed to think, that you might, without deviating at all from the language of any of the sections, say that this was a good register ; I mean from the language of either sections 5, 7, 8, 10, or 12. But supposing there were difficulties or incongruities arising out of those sections, I think those sections must for that purpose be considered as directory only, and be allowed to prevail in so far as they are consistent with the great scope of the Act, which is to contain a grant of the Parliamentary authority with that which had been given

by the Crown before, namely, the franchises belonging to this Society. Upon that ground I conceive that the Judgment of the Court of Queen's Bench, which proceeded, as it seems to me, on pretty much the same ground, ought to be affirmed.

Mr. Justice Cresswell.—I am entirely of the same opinion.

Mr. Baron Platt.—This Act of Parliament was passed for the purpose of remedying an evil; and it is very fit to look at the Preamble of it, in order to see against what evil it was directed. Now in the van we find this:—"Whereas it is expedient for the safety of the public that persons exercising the business or calling of Pharmaceutical Chemists in Great Britain should possess a competent practical knowledge of Pharmaceutical and general Chemistry, and other branches of useful knowledge." That is the first evil which is referred to. Now is there any other evil mentioned? Another evil mentioned is:—"And whereas it is expedient to prevent ignorant and incompetent persons from assuming the title of, or pretending to be, Pharmaceutical Chemists, or Pharmaceutists in Great Britain, or Members of the said Pharmaceutical Society." Now those are all the evils which are contemplated to be redressed. It is also stated in the Preamble:—"And whereas certain persons desirous of advancing Chemistry and Pharmacy, and of promoting an uniform system of educating those who should practise the same, formed themselves into a Society called 'The Pharmaceutical Society of Great Britain,' which Society was, on the eighteenth day of February, one thousand eight hundred and forty-three, incorporated by Royal Charter, whereby it was provided that the said Society should consist of Members who should be Chemists and Druggists who were or had been established on their own account at the date of the said Charter"—that is one class—"or who should have been examined in such manner as the Council of the said Society should deem proper, or who should have been certified to be duly qualified for admission, or who should be persons elected as Superintendents by the Council of the said Society." Now is there any complaint made of any election according to the terms of the Charter? None. It is perfectly clear, as far as those powers were given to be exercised by this Society, that they are not held up as having been abused in any way, and, therefore, we must confine ourselves to the mischief *aliunde*. Now what is the first section of the Act of Parliament after the Preamble? "That the said Charter of Incorporation, granted to the said Society on the eighteenth day of February, one thousand eight hundred and forty-three, save and except such part or parts thereof as are hereby altered, varied, or repealed, shall be, and the same is hereby confirmed and declared to be in full force and virtue, and shall be as good and effective to all intents and purposes as if this Act had not been passed." Therefore, unless it is altered, varied, or repealed, the Charter stands just where it did before, giving identically the same powers to the Society, who were to exercise the powers therein mentioned unless it is altered, varied, or repealed. Now the only difficulty I have had about this is, whether the machinery which has afterwards been proposed to be exercised in this Statute, is not inconsistent with the continuance of these powers in the Society. But, however, certainly, the reasons which have been assigned by my learned brethren who have preceded me, as well as those which have also been communicated in our private discussion upon the subject, have gone very far to convince me that this Judgment ought to be affirmed.

Now the 5th section requires that the Registrar shall be appointed, and he is to make out a register of all persons being Members of the Society. Well, then, we have the 10th section, which certainly does produce a good deal of doubt at first, but when it comes to be considered, perhaps the doubt nearly vanishes. After stating that the examination is to take place by examiners, not chosen by the Society, but competent persons, in pharmacy and botany, for the purpose of examining the parties to be admitted into those particular branches, it goes on to say: "Every such person who shall have been examined by the

persons appointed as aforesaid, and shall have obtained a certificate of qualification from them, shall be entitled to be registered by the Registrar according to the provisions of this Act." Then it shows afterwards what that registration is: "And every such person duly registered as a Pharmaceutical Chemist, shall be eligible to be elected as a Member of the said Society." It is perfectly clear, then, by this Act of Parliament, that two classes were contemplated by these different sections which follow after the 5th; and, it is equally clear, that the Registrar ought to keep such a list of all the addresses and descriptions of those persons, as to be enabled, at any time when called upon, to communicate whether the party has undergone an examination alone, or has become a Member of the Society. One can quite understand why those two classes should exist. It may be very useful to a Chemist in the wilds of Cornwall, who may be perfectly fitted to go through an examination, and to put on his door this recommendation to the public, that he has gone through that examination, and is a fit and proper person to dispense chemicals and drugs—it may be very useful for him to do that, but not to be a Member; there is no occasion for his coming up to town and attending their meetings; he has all that he wants; he has all the requisites for the purpose of showing what his qualifications are, and his fitness for carrying on his profession. It seems to me, therefore, there really is a reason for the formation of two distinct classes, and if a man undergoes an examination, and entitles himself to be called thereafter a Pharmaceutical Chemist, he has the privilege, if he chooses it, of becoming a Member. It seems to me, I own, that the Registrar ought to have included two parties in the register which he is to make out by the 5th section. What is the object of this *mandamus?* The object of this *mandamus* is to direct the Registrar to make out a different register from that which he has made out, whereas, in truth, and in fact, the one which he has made out appears to me to be the proper one; because, if these powers still exist in the Society, the persons whose names are objected to as appearing in that, are properly upon the register. For these reasons it seems to me that the Judgment of the Court of Queen's Bench ought to be affirmed.

Mr. Baron Martin.—As I was at one time rather inclined to suppose the names of these three gentleman were not properly on the register, I will state very shortly the reasons which have satisfied me that their names are properly there. They claim to be there by reason of being certified that they were duly qualified for admission by the means provided in the Charter. Now, on looking through this Act of Parliament, in reality the only thing which the Act of Parliament was necessary for, is, that which is provided by the 5th section, and it is clear, as it seems to me, that the real object of the Act of Parliament was to give a name to a certain class of skilled practitioners in the country, which they alone should be entitled to use; and that the object of the Act of Parliament, so far as the Society was concerned, was to prevent improper persons using the name of Pharmaceutical Chemists. It seems to me the Act of Parliament, when properly considered, pretty clearly enacts that all persons who, according to the original Charter, were competent to be Members of the Society, should be entitled to assume that name. There is nothing whatever in the Act to limit the selection of persons as Members, as originally arranged by the Charter; but the Legislature, for the purpose of preventing a monopoly, stated and enacted that other persons, who are not Members, should have a right, under the 10th section, to have themselves examined, and, their fitness being ascertained, that those persons, not being Members of the Society at all, should be then entitled to use the name of Pharmaceutical Chemist in the same manner, and to the same extent as at present shall belong to persons who are Members of the Society. It seems to me that that is the view of the Act of Parliament, and a very reasonable and proper view, because it gives to persons who were originally elected according to the Charter—which, as has been

observed, seems to have been properly carried out—the right to use this name, and, in addition, gives the same right to all persons who submit to the examination which is mentioned in the 8th and 5th sections, and so qualify themselves to use that name. For these reasons I am of opinion that there is nothing whatever in this Act of Parliament to alter the original right of the persons who were put on this register in the manner pointed out by the Charter, and that these three gentlemen have in all respects complied; and, therefore, I think, their names are properly there. It seems to me that this *mandamus* is not maintainable, and that there is nothing in the form of this register to call on us to interfere. I therefore am of opinion that the Judgment of the Court below must be affirmed.

Mr. Justice Crowder.—I am also of opinion that the Judgment of the Court below must be affirmed. After the full manner in which the case has been dealt with by some of my learned brethren, I shall give my opinion in a very few words indeed. The main point which was argued was one of great importance: that, subsequently to the passing of this Act, it was necessary that there should be an examination before any person became a Member of the Pharmaceutical Society, thereby inferring that by the Act of Parliament the Charter and Bye-laws, to a great extent, were repealed. It was argued that, looking at the Preamble, and referring to the necessity that ignorant persons should not be connected with the Pharmaceutical Society, or assume the title of Members of the Pharmaceutical Society or Pharmaceutists, that they should undergo an examination, and that the Act did, in truth, virtually and by implication, annul those modes of election which existed under the Charter. But when I look at the Act, I find in the Preamble that those very modes of election are referred to *seriatim* in four qualifications; and when I look through the Act, I do not find the Act saying, in any one section—be it enacted, that in future every person who shall become a Member shall pass a second examination; nor do I find a single word going to diminish, or in any way to alter or repeal any portion of the Charter. I therefore think it is impossible we can say that is the fact. Then, if that be not so, on the other part of the case, it seems to me, *primâ facie*, when the Pharmaceutical Society was established it was a Society of Pharmaceutical Chemists. Is there anything in this Act of Parliament to show, that after this Act passed the Society shall not be a Society of Pharmaceutical Chemists? I look at it, and I find nothing but the 5th and 6th sections, which seem to me, construed together, to make a register. You have here, therefore, that the Members are Pharmaceutical Chemists; and I should say, of course, also, that all those who become Members in any way must continue Pharmaceutical Chemists. Then the 10th section appears to me to be explainable in this way, that there is another class of persons introduced, who may have the title of Pharmaceutical Chemists, not being Members of the Society. They are the persons referred to here as undergoing the examination, which may be wholly independent of the will of the Society. They undergo the examination mentioned in the 8th and 9th sections, and having undergone that examination, they are put upon the register. I think there is no difficulty whatever in the Secretary, who keeps that register, knowing, and ascertaining, from the manner in which he enters them, who are Members, and who are Pharmaceutical Chemists not Members, because it seems to me clear that every Member is, and must be, a Pharmaceutical Chemist; and equally clear, that there may be many Pharmaceutical Chemists who are not Members. It seems to me that that is plain. I certainly was very much struck with the argument of Mr. Bramwell on the 12th section. It seems to me still a most absurd thing that the Legislature should enact that a man should not call himself what he really is. On these grounds I am of opinion that the Judgment of the Court below is right.

JUDGMENT AFFIRMED.

The Chairman remarked, that so clear and positive a decision on the part of the Judges, must be considered as a final and very satisfactory termination of the legal proceedings. It could not be supposed, after this unanimous Judgment, in which both Courts concurred, that any further question would be raised on the subject, and he hoped nothing would occur to disturb the future harmony and prosperity of the Society.

PHYTOLOGICAL CLUB.

May 9th, 1855.

ROBERT BENTLEY, F.L.S., PRESIDENT, IN THE CHAIR.

Several new members were elected.

Valuable donations of plants were received from Mr. Tatham, of Settle, through Mr. Reynolds; from Mr. Morgan, of Llandilo, and other friends of the Club; for which the thanks of the meeting were unanimously voted.

A paper was then read on

THE DEVELOPMENT OF THE VEGETABLE CELL,

BY MR. GRUNDY,

of which the following is an abstract:—

At present the views of Schleiden and Mohl are accepted as the true theories of cell formation: that of Mohl being considered of more general application. The occurrence of each form of cell development is incontestably proved. Starting with these premises, it remains to inquire if they are absolutely distinct, or are modifications of some more general law. The following reasons lead me to the latter opinion, and to consider that the same essential principle is concerned, but that in each case its *modus operandi* is different. Protoplasm, the universal agent in vegetable cell development, must be present, according to either view. According to Schleiden, "nuclei" appear in this protoplasm, round these is formed a primordial utricle, which secretes a cellulose coat. According to Mohl, this protoplasm divides into two portions, each secreting its coat of cellulose. The nuclei, according to Schleiden, "appear" in the protoplasm, whence they come he has not discovered. I believe that they are portions of protoplasm "individualized;" that is, portions which, through the operation of the mysterious power of vitality, have become independent individuals, and centres of existence. In Mohl's view, I look upon these two portions of separated protoplasm as in fact two large "nuclei." The main difference between these theories appears to be, that according to one, the whole protoplasm becomes divided into two, sometimes more, individuals; according to the other, portions only of protoplasm appear capable of undergoing this change. Mohl seems to me to restrict too much this idea of the primordial utricle; he looks upon it as an actual tangible membrane. I question this, looking upon it as simply a layer of protoplasm applied to the walls of the cell. Indeed, I should apply the term to protoplasm quite filling a cell; in this case, however, the word *utricle* would be inappropriate.

I would accordingly submit the following sketch of a theory of vegetable cell development:—"Cells can only be formed from protoplasm. The operation of vitality upon this protoplasm consists in giving it what I have ventured to call a capacity for 'individualization;' that is to say, a tendency constantly to divide into smaller portions, each secreting a cellulose coat, and becoming in fact a cell." From the above observations it will be seen that this view will clash with neither of those at present received. It would seem much more probable that one distinct definite plan would be adopted than two. The spore development of some *Algæ* (*e. g.*, *Achyla prolifera*) seems to me to connect cell division, with free cell formation. In these cases the protoplasm divides into a number of individuals. With regard to the nature of the vital force, and the means by which it operates, in causing the individualization of protoplasm, and deposit of a cellulose membrane on its surface, our knowledge is easily summed up. As yet we know nothing at all about it.

After some discussion, the President announced that the next meeting would take place on Wednesday evening, November 14th.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

On Friday evening the 25th of May, the usual Pharmaceutical Meeting was held at the Royal Institution.

Mr. T. C. Archer read a paper, of which this is an abstract:

ON INDIAN GUMS.

The great demand for new materials of industry, originated by the Universal Exhibition of 1851, has been particularly remarkable in respect of the vegetable productions of India. Under the judicious government of the Court of Directors, several able men of science have devoted their energies to the task of learning the resources of that vast portion of the British Empire, and under the able direction of Dr. Royle, great stores of knowledge concerning Indian produce have been collected. Every part of the Company's territory contributed specimens of its produce, and articles were thus brought to notice which had never before been known. New dyes, new tanning materials, new drugs, gums, fibres, woods, perfumes, &c., were added to our commercial products; of these, the gums before you are a small portion. They are of several kinds :—1st. True gums; 2nd. Gum resins; 3rd. Oleo resins; Resins ; 4th. Extractive gums, of which the following are illustrations :—

1st. The gum of Cochlospermum Gossypium, Nat. ord. Sterculiaceæ.

2nd. Bdellium, from Balsamodendron Roxburghii ; gum Opoponax ; Olibanum, from Boswellia Serrata ; resin of Amyris ; resin of Alribe or Canarium Strictum, Nat. ord. Amyridaceæ ; Mutty Paut.

3rd. Dhoona, from Patna; gum of Odina Woodier, Anacardiaceæ ; gum Piney, Travancore, extensively used for varnish in China and Assam.

4th. Patachy Creeper of Travancore ; Vainga gum from Terminalia alata tomentosa, Nat. ord. Combretaceæ; E. I. Kino.

Mr. Abraham exhibited a fine sample of concentrated infusion of Senna, prepared *in vacuo*, and read the following paper on the subject of this preparation—

CONCENTRATED INFUSION OF SENNA.

The preparation of a concentrated infusion of senna involves more difficulty than most of the corresponding preparations of other substances. Boiling it down in an open pan destroys its efficiency, and the large proportion of the senna to the menstruum precludes the possibility of making it by sufficiently increasing the relative proportion of the former. What other methods may be effectual I do not know; but I find by experiment, that the infusion of the Pharmacopœia concentrated *in vacuo* and preserved by the addition of a small portion of spirit possesses the full activity of the infusion from which it was made. The spirit separates a little of the mucilage, but I believe the essence when diluted with water does not otherwise differ medicinally from the fresh infusion. At the same time I am far from recommending the substitution of one for the other.

Mr. N. Mercer introduced to the notice of the Meeting the subject of a Book Club. He pointed out the advantages to be derived from the formation of such a club amongst the Members of the Association. Some discussion ensued, and it was finally resolved that the Secretary should be requested to receive the names of such persons as wished to enter, and to call a meeting for the commencement of operations as soon as a sufficient number of names were enrolled.

The last meeting for the Session was held at the Royal Institution on Friday evening, the 22nd June,

MR. H. S. ALPASS IN THE CHAIR.

The Secretary read the following award of the gentlemen who had been appointed to decide on the respective merits of the Essays sent in to compete for Mr. Rawle's Prize.

Sir,—In compliance with the wish of the Council that we should award the Prize offered by Mr. Rawle for the best Essay on Hydrocyanic Acid, we have to report, that of the four Essays sent in, their relative order of merit is, in our opinion,

as follows:—1. "Nuda Veritas." 2. "Nil Desperandum." 3. "Spero Meliora." 4. "Study to gain Knowledge."

The Essay of "Nuda Veritas" indicates not only an intimate acquaintance with the subject, but also much greater industry than any of the others, and we have no hesitation in awarding the Prize to the gentleman competing under that motto.

(Signed) George Hamilton.
John Abraham.
Nathan Mercer.

To the Secretary of the Liverpool Chemists' Association.

The Chairman opened the envelope marked "Nuda Veritas," and announced that the name and address of the successful competitor was Mr. Robert Gibson West, 42, Berry Street.

The President's Annual Prize to the best student in the Pharmacy Class was awarded by Dr. Edwards to Mr. Samuels, both on the ground of his attention and diligent conduct throughout the session, and the superiority of his answers to the questions submitted to the class for examination at its close.

The Secretary (Mr. T. D. Walker) then read a paper on "The Past History, the Present Position, and the Future Prospects of the Liverpool Chemists' Association," in which he reviewed its rise and progress, remarked upon its present position, and expressed himself in sanguine terms with reference to its future career, describing the prospect before it as most bright and cheering. He alluded particularly to the good which had been already accomplished by the Library, and described its extension as of great importance to the future success of the Association. The formation of the proposed Museum was also mentioned as one of the most hopeful signs connected with the history of the Association, and a hope was expressed that the Members generally would exert themselves to promote the completion of the Museum, and individually endeavour to make it what it ought to be, a credit to the Association, and worthy of a high place in the list of such collections throughout the kingdom.

The following list of additional subscriptions to the Museum fund was read:—

	£	s.	d.		£	s.	d.
Mr. J. Ellison	2	2	0	Mr. G. Barber	0	10	6
Mr. J. Houghton	1	1	0	Mr. N. Brodie	0	10	6
Mr. O. L. Jones	1	1	0	Mr. T. Davies	0	10	6
Mr. W. Miller	1	1	0	Mr. E. G. Heaton	0	10	6
Mr. W. Procter	1	1	0	Mr. D. Mackinlay	0	10	6
Messrs. Wright and Crossley	1	1	0	Mr. T. Martin	0	10	6

ORIGINAL AND EXTRACTED ARTICLES.

CHARCOAL AS A MEDIUM OF INHALATION.

BY MR. STEPHEN DARBY.

The explanation of the real action of charcoal, in contact with effluvia, for which we are indebted to Dr. Stenhouse, and the application of it in many ways for sanitary purposes, as recommended by him, has naturally given rise to many suggestions for the use of this most important agent.

Amongst those which have fallen under my notice are one or two that have led me to make a few experiments; and although these are trifling, the results may perhaps be considered worth communicating.

My attention having been called to the advantages offered by charcoal for exhibiting remedial agents, as iodine, &c., in very minute proportions, by inhalation, I was somewhat in doubt whether the affinity of charcoal for iodine—which, according to M. Bechi and M. Magnes, is so strong as not to be overcome by a simple solvent—might not render useless the method proposed, as this would require the iodine to be diffused through the pores of the charcoal in a very finely divided state. The former gentleman, in his practically useful paper on the employment of charcoal as an economical agent for separating iodine from its natural and artificial combinations, detailed in the *Journal de Pharmacie* for July, 1851, states "that neither hot nor cold water removes from

charcoal the slightest trace of iodine." It is the same with alcohol, which one would have regarded as its true solvent; but quite the contrary occurs if we treat iodized charcoal with a substance for which the iodine has a strong affinity, and with which it forms an intimate combination—as with solution of potash, &c.

M. Magnes, a translation of whose paper appears in the Pharmaceutical Journal for April, 1852, states—"I intimately mixed together one part of iodine with nine parts of charcoal, only retaining its hygrometric water. The product had neither the odour nor flavour of iodine; and having washed it on a filter, I ascertained that the water which passed through was inodorous and colourless, and that it did not give a blue colour to starch paste."

I first employed ordinary wood charcoal, in the proportion used by M. Magnes (nine parts to one of iodine), and found, as he states, that from the salts of the alkalies and alkaline earths contained in the charcoal, it was all converted into iodides of potassium and calcium, with traces of iodates of potash and lime.

I then used charcoal that had been exhausted with hydrochloric acid, thoroughly washed and dried, and treated it with iodine in the same proportion (one part to nine), when I found, on triturating the mixture with a small quantity of water and throwing it on a filter, that no free iodine was contained in the water, neither could I detect any trace of iodic acid or any combination of iodine; but on the addition of alcohol to the well-drained charcoal, a densely coloured solution of iodine (proved by the usual tests) passed through the filter. M. Bechi is therefore in error in stating that alcohol does not remove it. Although the combination with, or rather retention by, charcoal is powerful enough to prevent the abstraction of iodine by water, still it would not appear sufficiently so to cause any objection to its employment for the purpose proposed should this be thought desirable, more especially as M. Magnes has shown that in drying at a moderate heat in presence of watery vapour the iodine is in great part given off.

It is of course necessary, for the reason before stated, to use charcoal free from alkalies, alkaline earths, and their salts.

The employment of charcoal respirators has given rise to the objection—not, I think, well founded—that the charcoal would by use become deleterious, owing to its absorption of the carbonic acid given off from the lungs, and also from the formation of this gas by the oxidation in its pores of the volatile carbonaceous matter, or hydrocarbons, given off in small quantities from the same source. To determine if this be the case, I took a certain weight of coarsely grained wood charcoal, placed it in a percolator, the receiver of which contained a solution of baryta and air that had previously been freed from carbonic acid, and passed a considerable quantity of cold boiled distilled water through the charcoal; only a slight turbidness was caused: this was allowed thoroughly to deposit, the supernatant liquor withdrawn by means of a syphon fixed in the apparatus, care being taken to admit only air free from carbonic acid. The precipitate was twice again washed, allowed to settle, and the water withdrawn, when the precipitate thrown on a filter dried and ignited gave (deducting the filter ash) 0·55 grains of residue. A similar weight of charcoal in respirators was worn for six hours by three healthy individuals, and treated in exactly the same way as the above; the residue obtained was only 0·33 grains, or somewhat less than that from the charcoal which had not been respired through. In both cases the carbonate of baryta contained only a trace of sulphate. An equal proportion of charcoal, heated to low redness and cooled in an atmosphere of carbonic acid, when treated in the same manner, caused a dense precipitate of carbonate of baryta; so that the charcoal does not prevent the abstraction by water of the carbonic acid, as is the case with iodine.

If there were any grounds for the objection raised, the second experiment should have shown at least an excess of carbonate of baryta over the first, for, according to Scharling, "a man weighing 170lbs. gives off from the lungs, in

the course of one hour, 33·5 grammes (more than 500 grains) weight of this gas," consequently a considerable volume must have passed through the charcoal employed. That the reverse is the case is doubtless due simply to the somewhat larger amount of alkaline carbonates contained in the first portion of charcoal.

140, *Leadenhall Street.*

ON TRAGACANTH AND ITS ADULTERATION.

BY SIDNEY H. MALTASS, ESQ.

(*From a Communication addressed to Mr. Daniel Hanbury.*)

According to your request I have obtained from various sources some information respecting gum Tragacanth; that regarding the mode of collecting is from eye-witnesses—that upon preparing it for the European market, from personal experience.

The small prickly shrub which produces tragacanth, grows wild in many parts of Asia Minor, particularly in Anatolia. It is termed by the Greeks *Ketré*, but is also known to the educated Greeks by its real name, Τραγακάνθινος; the gum is in Anatolia likewise called *Ketré*, but to the Greeks it is also known as Τραγακάνθινον κομμι.

The principal places in which tragacanth is collected, are Caissar or Kaisarieh (the ancient Cæsarea), Yalavatz, Isbarta, Bourdur and Angora. The gum from Yalavatz and Caissar is considered the best.

Formerly the proportion of *flaky* or *leaf gum* in the whole quantity collected was very small, as the peasants contented themselves with picking off from the shrubs the natural exudation; of later years, a more systematic process for obtaining the flaky gum has been adopted at Yalavatz, and has since been followed by the Caissar and other districts. Gum tragacanth is now collected in the following manner:—

In July and August the peasants clear away the earth from the lower part of the stem of the shrub, and make several longitudinal incisions with a knife in the bark; the gum exudes the whole length of the incision, and dries in flakes; three or four days are sufficient for this purpose, and the gum is then collected. In some places also the peasants occasionally puncture the bark with the point of the knife. If the weather be hot and dry, the gum is white and clean; but if the atmosphere be damp and the heat but moderate, the gum requires a longer time to dry, and assumes a yellow or brown tinge. High winds are favourable for drying, but the gum accumulates a certain proportion of earth. Whilst the peasants are engaged in this labour, they pick off from the shrubs the gum which exudes naturally, and it is this which chiefly constitutes the quality known in England as *Common* or *Sorts*.

The whole of the tragacanth gathered is mixed and sold to native merchants, who send it to Smyrna for re-sale in bags containing about two hundredweight each. In this state it is termed *rough gum*, and contains as follows:

Flaky or leaf gum, perfectly white.....	40 to 50	per cent.
Ditto ditto discoloured or brown	15	25
Vermicelli gum.....	10	15
Common or sorts.....	35	10

The finest parcels contain the most *vermicelli*, which is nothing more than the siftings of the *leaf* gum which is broken by carriage from the interior and by removing from one place to another, together with the small vermicular masses termed *Sesame seed*, which are collected with the *leaf* gum.

When gum tragacanth is purchased for shipment to Europe, it is prepared in the following manner:—The large, white, flaky, or *leaf* gum, termed *French quality*, is first picked out, and the residue is sifted through a coarse sieve; what remains upon the sieve is *common* or *sorts gum*, mixed with *discoloured leaf*,

which is returned to the pickers, who then remove the slightly discoloured *leaf gum*, which is termed *English quality*. The remainder is then examined, and any stones or very black, dirty pieces are thrown aside as refuse, the rest, composed of naturally-exuded gum and brown *leaf*, is termed *common* or *sorts*.

The head-man or master-picker then re-sifts with a finer sieve whatever gum passed through the first, occasionally throwing out any straw or light substance which rests at the top. The gum remaining upon the sieve after this second sifting is given to women to pick at their own houses. They separate the *white* from the *brown*, and the *brown* from the *common*. The first is mixed with the *French quality*, the second with the *English*.

A third sifting takes place with a still finer sieve. The gum which passes through is termed *Sesame Seed*, and the coarser which remains upon the sieve, *Vermicelli*. Both qualities are carefully picked by women. When cleaned, the *Sesame Seed* is again sifted with an extremely fine sieve; and the dust and minute particles sifted out, are added to the *sorts* or *common gum*. The *Vermicelli* and *Sesame Seed* are then mixed together. This mixture forms the *Vermicelli Tragacanth* of commerce.*

When the gums are intended for the French market, the fine white *leaf* only is shipped; the *vermicelli* is sold for Trieste, and the discoloured *leaf* and *sorts* for England.

If, however, the whole parcel be worked for England and be required *good*, then the French and English qualities are mixed, and the brown *leaf* which had been left in the *sorts* is also picked out and added. By so doing the value of the *common* or *sorts* is reduced.

I believe it is supposed that more than one plant produces the gum Tragacanth of commerce. For this there is some foundation. In fact, very little gum Tragacanth is shipped to England in the state above described. In order to explain this, I must begin by stating that besides the real gum tragacanth of Anatolia, there are two other kinds of gum collected in Armenia and Caramania from various trees, principally (as I am informed) wild almond and plum. That from Armenia is sent to Constantinople from Moussul, whence it derives its name *Moussuli*. That from Caramania is sent direct to Smyrna, and is termed *Caraman*.

The average value of Moussul gum is 10 *piasters* per *oke* of lb. $2\frac{67}{100}$, equal to

---

* The various siftings and pickings to which gum Tragacanth is subjected at Smyrna, may be thus explained:—

- Rough Gum Tragacanth, as purchased of the peasants
  - Bold white leaf gum, called *French Quality*, is picked out
  - Residue is sifted through a coarse sieve .....
    - *Common* or *Sorts* and *discoloured leaf* remains upon the sieve .....
      - Slightly discoloured leaf called *English Quality*.
      - Common or sorts
      - Refuse.
    - Residue is sifted .....
      - Small white to be mixed with *French Quality*.
      - Small brown to be mixed with *English Quality*
      - Common or sorts
      - Residue is sifted
        - Sesame (is sifted)
          - Dust added to *sorts*
          - Sesame
        - Vermicelli (remains on sieve) ..... Vermicelli gum of commerce
        - Refuse.

about £3 16*s.* sterling per cwt.; Caramania gum is worth *p.* 4 or *p.* 5 per *oke*, or £1 10*s.* to £1 18*s.* per cwt., whereas the usual value of gum tragacanth in its rough state is £10 per cwt.

Both these gums are, I believe, almost worthless, but are paid for at these high prices for the purpose of mixing with gum Tragacanth, and by some are considered to be an inferior kind of the same gum. As neither Caramania nor Moussul gum occur in flaky pieces like tragacanth, and as they are of a dark colour, particularly the former, they would be easily detected if mixed with *leaf* gum, without previous preparation. The Jews, therefore, who adulterate all the drugs of Turkey, have found means of deceiving the eye in the following manner.

A quantity of Caramania gum is broken up into small irregular pieces, which are whitened with *White Lead*; the whitened gum is then mixed with *leaf* gum to the extent of 50 per cent. It is prepared in a similar manner for the *vermicelli*, but is pounded into smaller pieces and added only to the extent of 25 to 30 per cent. To adulterate the *sorts* or common gum, the Caramania gum is prepared in a similar manner, but the pieces are left larger: the proportion added is frequently 100 per cent.

Moussul gum is used for adulterating the better kinds of tragacanth.

The average expense of handpicking 1000 *okes* or 2667 lbs. of gum Tragacanth, is at the rate of 1½ piasters per *oke*, or eleven shillings per cwt. Thus:—

Labour of men, picking and sifting, 119 days, at piast. 10 per day ...	1190	0
Picking by women, 130½ *okes* broken leaf gum, at piast. ⅝ per *oke* ...	81	56
" " 64¼ *okes* Vermicelli, at piast. 1 per *oke*	64	25
" " 20 *okes* Sesame Seed at piast. 1½ per *oke*.....	30	0
Superintendent, 11 days, at piast. 10	110	0
Present to head-picker	25	0
	1500	81

Note by Mr. Hanbury.—[The author having had the kindness to forward a series of samples illustrative of the foregoing notice, it may not be uninteresting here to enumerate them:—

Superior qualities.

1. White picked Yalavatz gum tragacanth.
2. ———— Caissar gum tragacanth.
3. French assorted *leaf*—sample of seven cases.
4. Broken *leaf* picked by women, mixed with fine *leaf*.
5. Broken *leaf* of Caissar gum, mixed with fine *leaf*.
6. Vermicelli as picked out before mixing with *Sesame*.
7. Vermicelli—sample of one case.
8. Very small *leaf*, termed *Sesame*, mixed with *Vermicelli*.

Inferior qualities.

9. Common *leaf* mixed with *English assortment*.
10. English assorted *leaf*—sample of four cases.
11. Common or sorts—sample of two cases.
12. Small refuse, thrown out—almost worthless.
13. Large refuse gum—almost worthless.

Gums used for the Adulteration of Tragacanth.

14. Moussul gum.
15. Caramania gum, first quality, worth £2 10*s.* per cwt., to be mixed when broken up and whitened, with fine *leaf* and *Vermicelli*.

16. Caramania gum, second quality, worth £1 10*s.* per cwt., to be mixed when broken up and whitened, with *sorts* gum.

17. Caramania gum, broken into fragments and whitened with white lead, for mixture with *English assorted leaf*, in the proportion of 50 per cent.

18. Caramania gum in smaller fragments, whitened with white lead, for mixture with *Vermicelli*, in the proportion of 50 per cent.

19. Caramania gum, whitened with white lead, for mixture with *sorts* and common gum, in the proportion of 100 per cent.

The substances designated *Moussul Gum* and *Caramania Gum* belong to the somewhat ill-defined group described by pharmacologists as *Bassora Gum*, *Kutera Gum*, and *False Tragacanth.*

In a small but interesting collection of gums and gum-resins formed in Persia by W. K. Loftus, Esq., and deposited partly in the British Museum, and partly in the Museum of the Royal Gardens at Kew, is a specimen of our *Moussul Gum*, stated to be the "common *Ketira* of the Arabs, exuded from the *Gawan* or *Gubban* of Persia." Is this plant the *Cochlospurmum Gossypium*, De C.?

The *Caramania Gum* appears identical with the *Gomme pseudo-adragante* of M. Guibourt, regarded by that author as the produce of *Astragalus gummifer*, Labill.

Further researches, however, are much required to determine botanically the origin of these substances.

The practice of whitening gum with carbonate of lead is deserving of attention. Mr. Maltass was informed upon his first inquiries on the subject, that the whitening was effected by starch ; this, however, proved untrue, and it was afterwards reluctantly admitted that white lead was employed. I can fully confirm the existence of carbonate of lead in the samples No. 17, 18, and 19 ; and can also state that I have readily detected lead in the adulterated *Small Tragacanth* imported into the London market.

The gum used in adulterating tragacanth can readily be recognized upon careful inspection.—D. H.]

PRACTICAL RULES AND RECIPES IN ELECTRO-DEPOSITION.

BY GEORGE GORE, ESQ.

(*Continued from page* 513, *vol. xiv.*)

58. Small articles, such as spoons, knives, forks, snuffers, &c., are generally "wired" before they are cleaned, *i. e.*, they have small copper wires, size number twenty or twenty-two of the Birmingham brass wire guage, and about fifteen or eighteen inches long, twisted round them to suspend them by when in the vat, and to conduct the electricity; larger articles, such as teapots, jugs, &c., are generally wired at some advanced stage of the cleaning process after they have been "scratched;" and very large articles, such as fenders, hat-stands, large ornamental iron-work, &c., are not wired at all, but are suspended in the solution by strong copper or brass hooks; in cases where a very good and safe connexion is required, the connecting wires are soldered to the articles.

59. Articles formed of wrought iron, cast iron, steel, or zinc, are first boiled in water containing potash, to remove any grease or tarry matter which may be upon them; they are then swilled in water and immersed for a few minutes, or from that to several hours in water containing from one-tenth to one-twentieth by measure of sulphuric acid (oil of vitriol), according to the kind and condition of the metal, until the acid acts pretty freely upon them ; zinc generally requires a weaker liquid than iron, and smooth wrought iron or steel than rough cast iron; after being rinsed in water they are taken to the scratch brush lathe and scoured with rapidly revolving brushes of fine brass wire, moistened with water or stale beer; rusty iron articles and coarse iron castings often require several soakings in acidulated water, with alternate scourings with sand and with a coarse scratch brush, and sometimes even filing, to remove all the dirty patches upon them.

60. Brass, copper, and German silver articles are first boiled in a solution of

potash, then rinsed in water, next dipped either into nitric acid (aqua fortis), or into "dipping liquid" (a mixture of sixty-four parts water, sixty-four parts sulphuric acid, thirty-two parts nitric acid, and one part hydrochloric acid (spirit of salts), then well washed in water and immersed in the depositing vat, the connexion with the battery being made before immersion. In every case the articles are well rinsed in water to remove the adhering acid before putting them into the vat, otherwise the deposit will not adhere.

61. Another plan occasionally adopted to assist in cleaning articles, is to suspend them for a short time in the depositing liquid (unless the liquid is a valuable one) in connexion with the positive pole of the battery; this dissolves the surface of them a little, and loosens the impurities.

62. Every large plating establishment has a number of pickling jars, pans, and vats of various sizes, stoneware dipping jars, several large boilers of potash liquid, various scratch brush lathes, and several washing troughs with a plentiful supply of clean water.

63. It is of the utmost importance with articles which are to receive an adhesive and uniform coating, that they be perfectly cleaned before immersion in the depositing vat, otherwise the coating will not adhere, or will vary in its colour or appearance in different parts; and in consequence of this perfect degree of cleanliness required, the process of cleaning often involves more trouble than that of depositing, polishing, &c.

64. All metal articles which require an adherent coating are taken immediately, while still wet, from the cleaning process to the depositing vessel; articles of iron, steel, brass, copper, and German silver, are generally rinsed in water after being scratched, and are then immersed in the silver plating liquid; sometimes they are swung to and fro several times in the liquid before connecting them with the battery, to make the silver adhere more firmly. Those of Britannia metal are taken direct from the boiler of potash ley without rinsing in water, and immersed in the depositing liquid, the connecting wire being attached to the rod of the battery whilst the article is passing down into the liquid.

65. Much difficulty was experienced in the earlier days of electro-plating in making the silver adhere upon copper or brass, in consequence of the copper being acted upon by the cyanide solution, and coating itself with a thin film of silver by simple immersion; and the coating put upon this by the battery did not adhere. To prevent this, some of the electro-platers here make use of the plan patented by Dr. Leeson, viz., to rub the surface of the copper or brass articles with a solution of cyanide of mercury and cyanide of potassium just before immersing them in the depositing vat; others cover them with a film of mercury, by rubbing them with an aqueous solution of nitrate of mercury before immersion.

66. The practical minutiæ of preparing the surfaces of various metals for receiving adhesive and non-adhesive coatings of different metals and in different liquids vary considerably in different manufactories, and much information yet remains to be acquired respecting the particular methods required for particular metals and liquids, and from a want of this knowledge the most skilful operators occasionally fail in producing complete and strong adhesion, especially in coating Britannia metal, zinc, lead, tin or steel, with silver; iron or zinc with copper, &c.

67. When we wish to deposit non-adhesive coatings upon metals, such as in copying engraved copper-plates, medallions, &c., in copper or silver, we must first thoroughly clean them by any suitable means, such as by brushing with fine emery, or by any of the means already described; after being cleaned the connecting wires are soldered on, and they are allowed to stand in a cool place for twelve or twenty hours before immersing them in the vat, so that they may slightly oxidate and thus prevent adhesion; but if it is required to deposit upon them immediately, they are either thoroughly brushed all over with a soft camel's hair brush and black lead, or rubbed all over with soft cotton wool and

a little sweet oil, and the oil then wiped cleanly off with more clean cotton, or they are rubbed all over with cotton wool moistened with treble distilled spirit of turpentine, containing a little bee's-wax dissolved in it in the proportion of a piece of the size of a small pea in a *gill* of the spirit.

68. Any parts of metal articles which require no deposit upon them, such as the backs of medallions—articles requiring to be gilded in one part and silvered in another, &c.—must be "stopped off" by grease, oil, wax, varnish, lacquer, or other non-conducting substance in the parts which are not to be coated; for articles which require to be immersed in a hot solution, as in gilding, copal varnish is generally used for stopping off, but for common use any common varnish, or such as engravers use for a similar purpose, will do very well.

69. Many works of art, such as medals, statuettes, busts, &c., are not copied direct by the deposition process, but an intermediate cast of them is taken in some suitable material, such as gutta percha, wax, resin, stearine, glue, &c., and the metal is deposited either upon this mould or upon a second one taken from it.

70. One of the best substances I have used for ordinary moulding is a composition of my own, consisting of two parts of gutta percha and one part of Jeffery's marine glue. The glue is cut up into small pieces and melted at a gentle heat in an iron ladle, and the gutta percha also cut up small is then added, and the whole constantly stirred vigorously at a gentle heat until the two are thoroughly incorporated.

71. To copy the two sides of a metallic coin or medal in this substance, a strip of sheet brass or copper about three-quarters of an inch wide is first wound closely round the edge of the medal, and its ends soldered together; two round balls of the composition quite hot and soft are then pressed simultaneously against the two faces of the coin by two thick and flat plates of cold iron, and the whole screwed up in a vice, gently at first, but increasing the pressure gradually to a high degree as the substance gets cold. In about two hours, or when quite cold, the composition which contracts in cooling may be easily removed by means of a gimlet, and if the operation has been carefully performed the copies will exhibit bright and sharp impressions of the original, and will be free from air bubbles.

72. This substance presents several important advantages over gutta percha alone as a moulding material; it is softer when heated, and takes a much sharper impression; it contracts more in cooling, and may therefore be more easily removed from the original; and in taking the black lead it is most excellent, far superior to gutta percha; and with ordinary care many copies in copper may be taken from it by deposition—I have taken upwards of ten from one such medallion.

73. When the objects to be copied are much undercut, or when we wish to take a mould of a bust all in one piece, elastic moulding composition is required; the best substance of this kind is composed of four parts of the best Russian glue and one part by weight of treacle; the glue is broken into small pieces and soaked for one or two hours in sufficient cold water to cover it; when it is quite soft the superfluous water is thrown away, and the softened glue, together with the treacle, is heated in a common glue pot to nearly a boiling heat and stirred until the two are thoroughly mixed.

74. If the undercut article is a metallic medallion it should have its edge encircled by a strip of stout paper, and the glue quite hot, and of the consistency of thin treacle poured upon its surface; it is then allowed to stand until the composition is quite dry and firm, which will be from two to twenty-four hours, according to its bulk; when quite dry the copy may be taken off without injury by carefully stretching and drawing it at the same time in the direction of the overhanging parts.

75. If the object to be copied is a hollow metallic bust, it should first be partly filled with sand, to make it heavy and prevent its rising, and the opening

covered by sticking a piece of thick paper or millboard over it. The bust should then be placed in the centre of a cylindrical and slightly taper vessel, a few inches deeper and wider than itself, and the melted composition poured in steadily until it is a few inches above the top of the head. When it is quite dry and firm, which it will be in at least twelve or eighteen hours, it may easily be removed from the vessel by shaking, if the vessel has been previously oiled; and the copy may be removed from the bust by previously marking on its lower end the position of the face, and passing a knife carefully up the back of the bust, nearly to the crown of the head, then opening the elastic mould with your hands, whilst a second person lifts out the bust. If the bust is a plaster one, it will require to be previously saturated with oil, to prevent the glue adhering to it.

76. There are two methods in common use for rendering the surfaces of non-metallic moulds conductible. The first is that of black-leading, which is generally used for gutta percha, wax, resin, and composition moulds, where the work is not much undercut. The second is that of covering the surface of the mould with a thin film of silver or gold by means of phosphorus, and is generally used for the elastic undercut moulds, because the black lead cannot be easily applied to all their undercut parts.

77. In applying black lead to a mould composed of gutta percha and marine glue, the sharp end of a stout copper wire (size No. 16 or 18) is first thrust into its edge near the face of the mould, then a fine copper wire (size No. 28 or 30) is passed tightly round the edge of the mould close to its face, and its ends secured to the other wire. A strip of paper, one inch wide, is next fastened round the edge, to prevent the black lead going anywhere except upon the face of the mould. The black lead is then applied with a soft camel's hair brush, one with a large thick body of short hairs being the best. During the application the face of the medal should be breathed upon occasionally, to facilitate the adhesion of the black lead; and when the surface is perfectly black and bright, the superfluous black lead should be blown off and the strip of paper removed. The whole operation should occupy about ten or fifteen minutes, with a small medallion, the first time, but less in after operations.

78. There is the greatest difference between different specimens of black lead in their value for this purpose, some causing the deposit to spread all over very quickly, whilst others scarcely cause it to spread at all. The best I have found, and it is excellent, is "Dix's" black lead. It is sold in twopenny packets, one of which will last a long time for this purpose.

79. If the moulds to be deposited upon are very large, and especially if they have very deep hollows in them, several short and fine copper wires must be attached to the main wire after black-leading, and their pointed ends slightly inserted in the face of the mould in the most hollow parts, and thus cause the deposit to commence there, as well as round the edge. If this plan is not adopted, the hollow and distant parts will often receive no deposit, or the coating there will be much thinner than upon the nearer and more prominent parts.

80. The following is the phosphorus process of rendering moulds conductible in accordance with the patent taken out by Mr. Alexander Parkes;—first, there is the phosphorus solution; to make three ounces of it, melt sixty-four grains of wax or tallow, then dissolve eight grains of India-rubber cut up very small in 160 grains of bisulphide of carbon, and when it is dissolved add to it very carefully the melted wax, and shake the mixture thoroughly—then dissolve sixty-four grains of phosphorus in 960 grains of bisulphide of carbon, add this solution to the previous ingredients, and thoroughly mix the whole by shaking;—second, the silvering liquid, to make twenty ounces, or one pint of it, dissolve eighteen-and-a-quarter grains of pure silver in about twenty or twenty-one grains of the strongest nitric acid, and then dilute it with twenty ounces of distilled water;—and, third, the gilding liquid, to make twenty ounces of it

dissolve five-and-a-half grains of pure gold in about twenty-two grains of hot aqua regia (a mixture of one measure of nitric acid, and from two to three measures of hydrochloric acid), and when dissolved dilute it with twenty ounces of *distilled* water.

81. The elastic mould, with its surface perfectly dry, has the connecting wire attached to it, and a number of fine guiding wires directed into all the hollow and distant parts of its surface; it is then, according to its shape, either dipped into the phosphorus solution for about one minute, or its surface is floated with it, and after being drained clean, it is allowed to dry for about a quarter, or half an hour; when perfectly dry it is either immersed in, or its surface floated with, the silver solution for about one or two minutes, until it appears like black china; it is then rinsed by pouring distilled water gently over it. It is next treated in a perfectly similar manner with the gold solution, which imparts to it a yellowish bronze appearance, and after further rinsing with distilled water it is ready for immediate immersion in the depositing vat.

82. The same patentee includes in his patent a phosphorus moulding composition, by the use of which the immersion in the phosphorus solution is dispensed with, the moulds themselves containing sufficient phosphorus to cause the reduction of the silver upon their surfaces from the silver solution;—to make one pound of the composition, melt together half-a-pound each of wax and deer's fat, then dissolve nineteen grains of phosphorus in 287 grains of bisulphide of carbon, which will form nearly three-quarters of an ounce of a solution containing one part of phosphorus in fifteen parts of bisulphide of carbon; keep the wax mixture barely melted, and add the phosphorus solution slowly and with brisk stirring of the fat, pouring it in at the bottom of the melted mixture by a vessel with a long spout to prevent its inflaming.

83. The objects to be copied are either moulded in this material, or if much undercut (or busts), they are first copied in the elastic moulding, and then the elastic mould copied in this composition. In either case the mould so obtained is prepared for deposition by immersing it in the silver and gold solutions as already described.

84. Surfaces of glass may also be prepared for receiving deposits by means of the phosphorus, silver and gold liquids, but not with very satisfactory results. I have adopted a much better method of preparing such surfaces by making use of Drayton and Thompson's patent process for silvering glass, which, when well executed, effects the object admirably, the deposit whether of silver or copper spreads instantaneously upon it, and the contact of the deposit with the glass is exceedingly close and perfect. It is done as follows: Take one part by weight of liquid ammonia, two parts of nitrate of silver, three parts of distilled water, and three parts of alcohol; dissolve the nitrate of silver in the water, add the ammonia, and shake them well, then add the alcohol and shake again, and allow it to settle until it is quite clear; pour off the clear liquid into the glass vessel to be silvered, which must be perfectly clean; then add to the clear liquid one quarter of a part of grape-sugar dissolved in weak spirit of wine and mix, and finally heat the liquid to about 150° or 160° Fah., and in about twenty or thirty minutes the glass vessel will become silvered. The liquid may then be thrown away, the vessel gently rinsed with distilled water, the connexion carefully made with the silver coating and the battery, and the deposit formed upon it in the ordinary way.

85. If a strongly adherent deposit is required upon glass or porcelain the only plan to be pursued is to send the articles to a glass and porcelain gilder, and have gold-leaf burnt into their surfaces; a deposit either of silver or copper may then be easily made upon them by the battery process, and will be perfectly adherent.

86 The easiest metals to deposit in their ordinary coherent state are copper and antimony. Copper may easily be deposited either by simple immersion (wash process) by the single cell, or by the battery processes; according to

Reinsch, iron may be coated with a durable and polishable layer of copper of any thickness (?) by simple immersion, thus: Mix together one measure of hydrochloric acid, three measures of water, and a few drops of an aqueous solution of sulphate of copper; clean and immerse the iron; wash it, rub it, and reimmerse it repeatedly, adding a few drops of the copper solution occasionally.

87. In depositing copper by the single cell process, a nearly saturated solution of sulphate of copper answers very well; but for the battery process an excellent solution may be made by dissolving four ounces, by weight, of finely powdered sulphate of copper (best quality) and one ounce, by measure, of sulphuric acid in about eighteen ounces of water, and then filtering it; neither of these solutions is fit to deposit copper upon iron, steel, or zinc, because the electrical relations of the metals in them are unsuitable, these metals decompose them rapidly, and reduce the copper upon themselves by simple immersion. For the electrical relations of iron and copper in various solutions see a paper of mine upon that subject in the *Pharmaceutical Journal* of Sept. 1853, containing the results of an examination of one hundred different liquids.

88. To effect an adhesive deposit of copper upon iron several solutions may be used; first, acetate of copper dissolved in water containing double tartrate of potash and soda; second, tartrate of copper dissolved in aqueous tartrate of potash; and, third, the green dicyanide of copper dissolved in aqueous cyanide of potassium; this latter solution requires to be used hot. It may be made thus: Take 65 parts of cyanide of potassium and 125 parts of sulphate of copper, pound each fine, and dissolve them separately in water; then add the two solutions together in a glass or stoneware vessel, mix them quickly, and take great care not to breathe the cyanogen gas evolved, because it is very poisonous. The light green precipitate of dicyanide of copper should be well washed until the wash waters yield no precipitate on the addition of a few drops of aqueous chloride of barium; when well washed and dried it must be dissolved to saturation in water containing about two pounds of cyanide of potassium to the gallon, and then about one-eighth more of the aqueous cyanide of potassium added. The solution should be used at about 150° Fah.

89. In connexion with copper the electro-deposition process has been applied to a great number of useful and ornamental purposes, among which we may enumerate the following:—To make copper cells for Daniell's batteries; to make stew-pans, boilers, pipes, &c. (patented); coppering the bottoms of boats; to coat steel pens (patented); coppering the surface of printers' type; making copies of stereotype plates and engraved steel or copper-plates or rollers; to protect iron and steel articles from rust, such as telegraph wire, bell wire, screws, ship's bolts, &c.; to copy daguerreotype pictures; to etch daguerreotypes; to coat glass chemical vessels; to make coppered cloth and electro-lace; to coat and protect metal and plaster statues, busts, and sculpture; to preserve the forms of flowers, fruits, ferns, seaweed, insects, reptiles, &c.; to make statues, busts, and figures, in copper; to reduce copper from its ores; to join the seams of pipes and other vessels of copper; it has also been extensively applied in the art of glyphography and electro-tint.

90. To make a Daniell's cell by electro-deposition, coat the inside of a jelly-pot uniformly all over with stearine, and then either black lead it or treat it with the phosphorus, silver and gold solutions; a connexion should then be formed with the lower part of the coating, and the deposit effected either by the single cell process, using the jelly-pot as the outer containing vessel, or by the battery process, using in either case a sulphate of copper solution. Stereotype plates or engraved copper-plates may easily be copied by soldering a wire to the back of the plate, then stopping off the back with varnish, and depositing upon the front by the battery process in a sulphate of copper liquid; engraved steel plates should be copied in a similar manner except that they should first receive a thin coating of copper in the cyanide of copper solution, and then be well rinsed in hot water and immediately immersed in the sulphate solution,

the connexion with the battery being formed before immersion, and the plate then moved about in the liquid; by these means the steel will be protected from the chemical action of the sulphate of copper, and the two coatings of copper will adhere to each other. To prevent adhesion to the steel, the surface should be previously prepared by some of the means already described. Iron and steel wire may be coated with a firmly adherent coating of copper by perfectly cleaning its surface and hanging the coils in the cyanide of copper solution upon a horizontal brass or copper rod, with the coils separate, and turning them occasionally, so that all parts may be coated, then making up the required thickness of copper in the sulphate solution, taking the precautions mentioned in the case of steel plates; iron screws and nails may be treated in a similar manner, except that they should be hung in the solutions in an open wicker basket, and shaken occasionally.

91. One of the most beautiful applications of the electro-deposition of copper is that of copying daguerreotype pictures; it is also one of the easiest to be effected; solder a wire to one corner of the back of the picture, then varnish the back and edges and let them dry, hang it in a perfectly clean sulphate of copper solution (one free from dust on its surface), the one mentioned (87), and connect it with one or two pairs of small Smee's batteries; in the course of twenty or twenty-four hours, when the deposit is sufficiently thick to remove, take it out, well wash it, and wipe it perfectly dry, then with a strong pair of scissors cut off the edges all round; the original and copy may then easily be separated by inserting the point of a knife or the end of a thin wedge of hard wood between them at the edges. If the process has been carefully conducted, and the original picture is a strong one, a most beautiful and vivid copy will be obtained; a number of copies may be taken from the same original, especially if it is a strong one, and has been well fixed by Fizeau's process; but the intensity of the copies and of the original appears gradually to diminish in each succeeding trial. Under some circumstances, especially with very regular action of the battery, a fine deposit, clear solution, and vivid original picture, I have observed a most extraordinary effect, viz., the picture has not disappeared, even in twenty-four hours, although the deposit upon the original plate has constantly increased in thickness, but has penetrated quite through the deposit, and appeared distinctly upon the back; I have observed the image repeatedly on the back as well as upon the front of deposits as thick as an address card. Sometimes the image was optically positive, and sometimes negative.

92. Cloth may easily be coppered by stretching it upon a sheet of copper slightly curved, so that the cloth may be in close contact with it all over. The back or hollow side of the copper is then varnished, and a deposit formed by the battery process all over the front of the copper within the meshes of the cloth, and when sufficiently thick, the deposit and cloth firmly united together, may be drawn off the sheet of copper. Mr. J. Schottlaender took out a patent December 8, 1843, for depositing either plain or figured copper upon felted fabrics; he passes the cloth under a plain or engraved copper roller, black-leaded and horizontally immersed in a sulphate of copper solution; the copper is deposited upon the roller as it slowly revolves, and thus the meshes of the cloth are filled with metal, and the design of the roller copied upon it, and the coppered cloth slowly rolled off.

93. Plaster and earthenware busts, figures, statues, &c., are coated with copper, by first saturating them with linseed oil, then thoroughly black-leading them, making a number of guiding wire connexions with all the most hollow and distant parts, and depositing upon them by the battery process, in a sulphate of copper solution, until they are covered with a sufficient thickness of copper to protect them, but not sufficient to obliterate the fine lines or features of the object.

94. Flowers, fruits, fern, seaweed, insects, &c., are coated, not by preparing them with black lead, but with the phosphorus, silver, and gold solutions, and

then depositing the copper upon them either by the single cell or battery processes.

95. Galvanic etching upon copper is effected by soldering a wire to the back of a copper-plate, then covering the front and back with a thin layer of engraver's etching ground, drawing the design upon the front surface through this material to the clean surface of the copper, and then hanging the plate as an anode in a sulphate of copper solution opposite a similar but clean brass or copper-plate, and connecting it with the positive pole of a small battery. The positive electricity in passing out of the prepared plate into the liquid at the unprotected lines and marks, dissolves the copper, and leaves sunken or engraved lines corresponding to the design etched in the composition; gradations of depth of the etching in different parts, and corresponding gradations of light and shade, are produced by suspending smaller or different shaped receiving-plates opposite different parts of the etched surface at different distances and at different angles, the deepest action being always at the parts nearest the receiving-plate, where the electricity passes most freely.

96. The art of glyphography consists in taking a smooth and flat sheet of copper, varnishing its back, laying first a layer of white and then a layer of black etching ground the one upon the other upon its front side, and drawing the design upon that through to the copper with different engraving tools, then black-leading the whole of this surface, and depositing a stout sheet of copper upon it by the battery process in a sulphate of copper solution; the deposited plate is then taken off, retouched with the graver, and fixed upon a block of wood for printing with ordinary type, in a similar manner to a stereotype plate.

(*To be continued.*)

REPORT ON THE SUPPLY OF SPIRIT OF WINE FREE OF DUTY FOR USE IN THE ARTS AND MANUFACTURES,

Addressed to the Chairman of Inland Revenue.

BY PROFESSORS GRAHAM, HOFMANN, AND REDWOOD.

(*Continued from page* 570, *vol. xiv.*)

Inland Revenue, 2nd Nov., 1854.

Gentlemen,—As I am informed that it is your intention to add some remarks to your Report on the "Supply of Spirit of Wine, Duty Free, for Use in Arts and Manufactures," I take the opportunity of requesting your attention to the passage in page 8 of the Report, in which you state, in effect, that as the oils in crude naphtha are removable from the mixed spirit by a process not very difficult, the question is reduced to the applicability of pure wood-naphtha for the object in view.

I am not entirely convinced that the question is thus narrowed. We have two objects:—First, To prevent the recovery of spirit of wine from the mixture in such a state of purity as to render it potable; and, second, to render the mixed spirit so offensive as to prevent any temptation to its use among the workpeople who will necessarily have access to it in the manufacturing processes in which it will be employed.

Now, it is obvious that the use of crude naphtha produces a more offensive mixture than that of the pure naphtha, and that it would probably be so offensive as to preclude its consumption by workpeople, and this would be an important point gained.

It is also obvious that any attempt to render it potable (as an article of commerce) would be more troublesome and expensive.

The question then remains, whether the crude mixture would be generally available in arts and manufactures.

This is a subject of great practical importance, and I shall be much obliged by your attention to it, and by the communication of the result of your inquiries.

I am, Gentlemen, your obedient Servant,

To Thomas Graham, Esq., F.R.S. John Wood.
A. W. Hofmann, Esq., F.R.S.
Theophilus Redwood, Esq.

Sir,—The observations which we desired to add to our "Report on the Supply of Spirit of Wine, free from Duty, for Use in the Arts and Manufactures," have reference to the mode in which the public is to be supplied with the spirit. On a review of the subject, and after further inquiry among manufacturers and others, we doubt whether it would be prudent to permit, at first, the retail sale of the methylated spirit. It has been represented to us that the unrestricted sale of the spirit would cause it to get into the hands of individuals of perverted tastes, who, in extreme cases, may use it for producing intoxication. Although we are satisfied that such a misapplication of the methylated spirit could only occur in some isolated instances among persons of confirmed habits of intemperance, yet it may be feared that even such cases would cause a public outcry against the measure before it had received a fair trial. We would, therefore, recommend that the methylated spirit should be issued by agents duly authorized by the Board of Inland Revenue to none but manufacturers, who should themselves consume it, and that application should always be made for it according to a recognized form, in which, besides the quantity wanted, the applicant should state the use to which it is to be applied, and undertake that it should be applied for that purpose only. The manufacturer might be permitted to retail varnishes and other products containing the methylated spirit, but not the methylated spirit itself in an unaltered state.

In thus suggesting a restriction upon the sale of the methylated spirit, we must, however, express our belief that this limitation may eventually be removed with safety, when the measure has been fairly and fully introduced.

Our attention having been directed by your letter of the 2nd November, 1854, to that part of our report in which we recommend the use of purified wood-naphtha rather than crude naphtha for preparing the methylated spirit, we have instituted new inquiries on this part of the subject.

We have, in the first place, to state, that the distinction of crude and purified wood-naphtha is not generally recognized in commerce. The term "crude wood-naphtha" when used, is understood to designate a very impure sort of naphtha, not in the state in which that substance is first produced, but in a partially, although very imperfectly, purified state. This product, which is of a brown colour, and contains tarry matter and oils which are not easily volatilized, after being further purified, constitutes the wood-naphtha generally met with in commerce, and which we have referred to as purified wood-naphtha. The terms "crude" and "purified" as thus applied, have not any definite signification; they are used to indicate an undefinable difference of purity, the principal feature of which consists in the presence of more difficultly volatilized matter in the less pure than in the more highly purified article.

We have further to state, that the purification of crude naphtha to the extent to which this is effected for commercial purposes, is not attended with any difficulty. Methylated spirit prepared with crude naphtha may also be rendered as free from taste and smell as that made with purified wood-naphtha, by simple and inexpensive means. We have had a methylated spirit prepared (No. 1 of the specimens sent herewith) containing 10 per cent. of the crudest wood-naphtha we could procure, and which was quite unsaleable. Now, by a single distillation from 10 per cent. of potash, this (as seen in No. 2) is highly purified, so as to be quite equal, if not superior, to the methylated spirit made with Turnbull's purified wood-naphtha, as recommended in the report. The cost of

applying this purification of methylated spirit would be less than one shilling a gallon.

We believe that if very impure wood-naphtha be used for making the methylated spirit, the spirit so prepared will not fulfil the requirements of any class of manufactures referred to in our report, unless the purification of the spirit before its use be permitted, and such, we presume, would not be deemed advisable. If this purification was forbidden, the honest manufacturer would obey the law, and work to a great disadvantage as compared with his less scrupulous competitors, who would resort to illicit purification. This of itself would be a great evil, and one, we fear, quite beyond the powers of the Excise to prevent. We admit that the methylated spirit made with crude naphtha would be more unpalatable than that made with purified wood-naphtha, and that the latter would be more likely than the former to be drank by the workmen employed in manufactories where such spirit was used; but, as already stated, we can only conceive it possible that such use would be made of methylated spirit by individuals of perverted taste and confirmed habits of intemperance, and in such instances we doubt if even the use of crude wood-naphtha would be sufficient entirely to prevent the evil.

The conclusions we have come to, as the result of our investigations on this subject, are, that methylated spirit made with a very impure wood-naphtha, could not be advantageously used as a solvent for resins by hatters and varnish-makers, as the less volatile parts of the naphtha would be retained by the resins after the spirit had evaporated, and the quality of the resins would be thus impaired; and that such methylated spirit would be almost wholly inapplicable for chemical and pharmaceutical purposes, and for the preservation of objects of natural history. The benefits anticipated from the proposed measure would thus be greatly limited, without, as we believe, any adequate advantage resulting, either in increased security to the Revenue or otherwise.

It is purified wood-naphtha, and not the impurity which crude naphtha contains, that presents the great and insuperable difficulty we have indicated, to its separation from spirit of wine with which it has been mixed. In fact, the more highly purified the naphtha is with which the spirit is mixed, the more difficult will it be to effect an alteration of this mixture, in the way contemplated, by any chemical process; and in proportion as this condition is fulfilled, the mixed spirit will be more valuable for use in the arts and manufactures as a substitute for spirit of wine. On the other hand, the impurity which constitutes the difference between crude and purified wood-naphtha, presents little or no difficulty in the way of its separation, whilst, for all the purposes referred to, it renders the mixed spirit containing it less applicable, and for some of those purposes it entirely precludes its application.

We are, therefore, unable to recommend any alteration in the mode of preparing the methylated spirit suggested in our Report.

THOS. GRAHAM.
A. W. HOFMANN.
T. REDWOOD.

London, Jan. 8th, 1855.

To JOHN WOOD, Esq.,
Chairman of the Board of Inland Revenue.

NEW MATERIALS FOR THE MANUFACTURE OF PAPER.

AT the quarterly meeting of the Geological and Polytechnic Society of the West Riding of Yorkshire, held on Tuesday, May 29th, in the Town-Hall, Pontefract,

RICHARD MONCKTON MILNES, ESQ., M.P., IN THE CHAIR,

Mr. Durden, F.C.S., of Leeds, read a communication "On New Materials for the Manufacture of Paper."

Mr. DURDEN commenced with some preliminary observations relative to the

greatly increased quantity of paper manufactured in this country of late years. In the year 1842, the quantity of paper made was 96,693,322lbs.; a steady increase took place up to 1846, when the quantity manufactured rose to 127,442,480lbs. In 1847-48, the total make did not reach 122,000,000lbs. in either year; in 1849 the trade rallied, and the manufacture has gone on steadily increasing; the quantity of paper made in 1853 being 177,623,009lbs., or 80,929,687lbs. more than 1842, and the probability is that, during the present year, the manufacture of 1842 will be almost doubled. Three causes amongst others have doubtless operated to render this increased manufacture of paper necessary :—1. The great extension of the home and export trade, causing an increased demand for packing papers; 2. The immense circulation attained by the periodical literature of the country of late years, thus requiring a larger supply of printing paper; 3. The penny-postage system, under which the number of letters passing annually through the post has increased from 76,000,000 to 443,000,000 in 1854, producing a greatly increased demand for writing papers. Mr. Durden estimates the consumption of paper of all kinds, of British and foreign make, in this country, at about 175,000,000lbs., or 78,000 tons. Mr. Durden then proceeded to call the attention of the meeting to the great variety of specimens of new materials, and of paper made therefrom, lying on the table. Amongst these were writing papers made of linen rags only, and of a mixture of cotton and linen, of which the great bulk of the writing papers of the present day are manufactured; paper made of cotton and flax waste; fine pottery tissue paper, manufactured by Mr. Lambe, of Newcastle, Staffordshire, formerly made exclusively of the finest linen rags, but now produced by the aid of chemical science from old ropes and cordage; straw paper; papers made of the fibrous peat of Piedmont, and the refuse of the sugar-cane; the dwarf palm of Algiers, the plantain and banana of tropical climes, the water arrow of Brittany, and the espato grass of Spain. Particular interest was shown in the examination of the papers produced from the refuse of vegetable fibres of native plants, as the hop-bine, couch grass or twitch, mustard stem, galingale, &c. Mr. Barling, of Maidstone, has succeeded in making a very good brown paper of the fibre of the hop-bine, and judging from the specimens of bleached fibre and pulp exhibited, there can be no doubt of perfect success being attainable in the manufacture of excellent writing paper from this material, some 15,000 tons of which are annually obtainable in this country, being at present only applied as shelter for cattle, or burnt to get rid of it. The paper and millboard made of couch grass or twitch, under Mr. Jeye's patent, are both of good quality; the establishment of a manufactory at Stamford will enable the farmer to find a market for what has heretofore proved a very troublesome weed. A gentleman present stated that he understood £2 per ton had been offered for dry twitch. Mr. Jeye's mustard-plant paper appears to be a useful, serviceable paper for many purposes. Dr. Hoskins, F.R.S., of Guernsey, has fully succeeded in rendering the galingale, a plant indigenous to the Channel Islands, available for the manufacture of paper, and is now converting large quantities of this material into the state of "half stuff" ready for the paper-maker. A manufacturer has made a printing paper from it of excellent quality for the Paris Exhibition. The galingale (*Cyperus longus*) belongs to the same natural order of plants as that from which the papyrus of the ancients (*Cyperus papyrus*) was obtained. Dr. Hoskins has therefore named his paper "Patent Papyrus." The flax paper manufactured under Mr. Jackson's patent (and which we believe to be the same as the Fibre Company's paper, whose bill has recently passed the House of Commons) is well adapted for newspapers, for which purpose it is more particularly to be manufactured. This paper will doubtless speedily obtain an extensive sale. Specimens of excellent paper pulp, made of fir, willow, and other cheap woods, by Mr. Schlesinger, of Bradford, and papers and millboards made of varying proportions of this wood-pulp and rags, excited much interest, as did also the exquisitely white jute pulp obtained by Messrs. Smith and Hollingworth's patent process, and the excellent quality of papers made therefrom. The cow-dung paper, made by Dr. Lloyd, of Warwick, was an object of curious interest; the animal is fed on flax straw, and the stomach performs part of the duty of the ordinary paper-pulping machine. Paper made of the leaves of trees and plants, of waterbroom, thistle plants, and a variety of other fibrous materials, were also noticed. De la Rue's oxide of zinc papers and iridescent papers were shown, and much admired. Mr. Durden also exhibited to the meeting a series of samples of new fibrous materials, lately collected on the Western Coast of Africa by Mr. Lilley, of Birken-

head, who has patented some useful machinery for preparing the plantain fibre for manufacturing purposes. The examination of one of these specimens, suggested to a gentleman present the application of the waste peelings of the withy (large quantities of which are grown on the chairman's estate in the immediate neighbourhood), as also the liquorice root of Pontefract, as capable of furnishing good materials for paper-making.

The CHAIRMAN having mentioned that he had in his possession a book printed many years since composed of papers made of various vegetable fibres, such as some of those mentioned in the communication before the meeting, inquired if Mr. Durden could afford any information as to the reason why these fibres had not been brought into use before.

Mr. DURDEN, after premising that he was unconnected with the paper manufacture, replied that, independently of the circumstance that the supply of linen rags had formerly been more in a ratio with the paper consumed, the operation of the Excise laws had doubtless interfered to prevent the introduction of many of these materials into use. When the duty was 3*d.* per ℔ on first-class, and 1½*d.* on second-class papers, all the latter were required to be made of certain fixed materials, as rope or cordage, &c. Hence an absolute restriction was imposed on the manufacture, and which continued until the equalization of the duty to 1½*d.* per ℔ on paper of all sorts manufactured. There could be no doubt that it would be far better for the interests of the paper manufacture, as well as every other, that it should be entirely free from the trammels of the Excise. The introduction of improved and cheaper methods of preparing and bleaching these fibres has also been one reason why greater attention has of late been paid to the use of these new materials. In replying to the question as to the using up of old paper and converting into new, Mr. Durden stated that this was now done to a considerable extent—the contents of the waste-paper basket being bleached and mixed with new pulp made very good paper.

A vote of thanks to Mr. Durden was unanimously passed for his interesting communication.—*Leeds Intelligencer*, June 2, 1855.

ON THE MANUFACTURE OF CHROMATE AND BICHROMATE OF POTASH, CHROMATE AND BICHROMATE OF SODA, CHROMATE OF LIME, CHROMATE AND DICHROMATE OF LEAD, CHROMATE OF ZINC, CHROMIC ACID, &c. &c.

WE believe that Dr. Bollman, who at one time was connected with the acetic acid works at Battersea, was the first person in this country who manufactured the salts of chrome. These he obtained from a parcel of chromate of iron, brought to this country from America as ballast. From him Midgley obtained useful information as to the preparation of chrome yellow, and Kurtz of chromate of potash manufactures with which their names have become identified.

Manufacture of Chromate and Bichromate of Potash and Soda.—The process first adopted for the preparation of chromate of potash was to calcine chrome iron ore with nitrate of potash. For this purpose the ore was reduced to a fine powder by means of heavy edge wheels, and sifted. It was then mixed with from one-third to one-half its weight of nitre in rough powder, and the mixture exposed to the heat of a reverberatory furnace for several hours, care being taken to stir the mass frequently during the operation. When, by the examination of a small sample, the decomposition was found to be complete, the calcined product was raked out of the furnace and lixiviated with water. A bright yellow solution of chromate of potash was thus obtained, from which, by quick evaporation, the salt was thrown down in a granular form. The chromate of potash thus obtained was from time to time removed from the bottom of the pan by means of large ladles perforated with small holes, and thrown on drainers to dry. By treating the concentrated solution of this salt with an acid having a more powerful affinity for the second atom of the potash than the chromic acid, the bichromate of potash was obtained. Regular crystals of chromate of potash are obtainable by a slow evaporation of a solution of the granular salt above mentioned. In order to effect a saving in the quantity of nitre employed, pearlash (carbonate of potash) was added to the mixture of chrome ore and nitre ; the great improvement, however, in the manufacture, was the dispensing

with nitre and oxidizing entirely by means of air admitted into the reverberatory furnace in which the ore mixed with carbonate of potash is calcined. Stromeyer, of Norway, having found that oxidation is effected more rapidly by the addition of lime to the ingredients just mentioned, the employment of that alkaline earth soon became general. The price of bichromate of potash in 1820 was 21*s.* per lb., at which time its chief employment was in the preparation of chrome yellow. The successful application of this salt in dyeing and printing has led to its more extensive use, and the improvements above mentioned, which have been effected in its manufacture, has caused the price to fall to about 8*d.* per lb.

Mr. Charles Watt, junior, found that the sulphates of potash and soda might be entirely substituted for the nitrates of those bases by the simultaneous employment of lime, which assists in the decomposition of the sulphate, thus effecting a great reduction in the cost of manufacture. His process is as follows:—The sulphate is to be ground or otherwise intimately mixed with the pulverized ore, and the lime is then added, which should also be intimately mixed with the mass. It is then to be subjected, for about four hours, to a strong red heat. The nature of the furnace to be employed for the purpose is not of any great importance, so long as carbonaceous matters from the fire are entirely excluded, and the required temperature is attainable. Unless strong heat is employed no decomposition will take place ; the temperature already employed in manufacturing this article from the nitrates will be sufficient, and the furnaces used in every way suitable. The mass should be well raked about every half hour, to insure the whole of it being sufficiently heated.

Mr. Tilghmann has patented two methods of manufacturing chrome salts. The first of these, dated February 1, 1847, is as follows:—To obtain chromate of potash or soda he mixes the chrome ore in powder with twice its weight of chalk, also in powder, and with a sufficient quantity of water works this mixture into a stiff paste ; the paste is then made into pellets half an inch in diameter, and thoroughly dried ; they are then placed in a vertical cylindrical retort, and chloride of potassium or chloride of sodium added, according as chromate of potash or chromate of soda may be required. At the bottom of the retort a steam-pipe enters, through which steam at a high temperature is conveyed ; there is also another pipe attached to the retort, through which atmospheric air is admitted, in quantity sufficient to convert the oxide of chrome into chromic acid. During the decomposition the muriatic acid passes off with the steam, and the alkaline base unites with the chromic acid to form chromate of potash or soda. The process is known to be finished by observing when the steam, which passes off, contains no acid, but only salt vapour. The contents of the retort are then to be withdrawn, and when cold, thrown into cold water, and the chromate dissolved out and crystallized.

Mr. Tilghmann's second process, patented the same date as above, is thus performed: He places evenly on the hearth of a reverberatory furnace a mixture of four parts of potash felspar, four parts of lime or the equivalent of carbonate of lime, and one part of chrome ore, all in powder, and intimately mixed. The heat is to be raised as high as possible below the fusing point of any of the ingredients, and the greatest care must be taken to prevent even incipient fusion, which would spoil the operation. During the process the air in the furnace must be carefully maintained in an oxidizing state, by admitting air through tubes passing through the roof of the furnace behind the fuel. When the decomposition has been effected the charge is withdrawn, and when cool the whole is thrown into hot water, and the chromate of potash taken out and recovered by evaporation and crystallization in the usual manner.

Mr. Swindell's process for manufacturing the salts of chrome is as follows:—The powdered chrome ore is mixed with its own weight of either common salt, or muriate of potash, or hydrate of lime. If chromate of soda be required, common salt is used, and the mixture exposed in a reverberatory furnace to a full red or even white heat, at the same time passing a jet of highly heated steam over the mass whilst in a state of fusion, well stirring the mixture every ten or fifteen minutes. When it is known by the usual method of testing the contents of the furnace that the process is finished, the resulting compound is found to consist of chromate of soda, the hydrochloric acid and iron having passed off in the form of sesquichloride of iron. The product is then withdrawn from the furnace, and treated in the usual manner of manufacturing the chromates and bichromates. The chromates of lime and potash may be obtained in the same way, by the substitution of muriate of potash

and lime for common salt. Bichromate and chlorochromate of soda may be prepared from the chromate of soda thus obtained, as also the bichromates of lime and potash.

Mr. J. C. Booth, an American Chemist, has patented the following method of manufacturing chromate and bichromate of potash. Mr. Booth's process consists in reducing the oxide of iron in chrome ore, either wholly or in part, by means of carbon in any of its several forms, or by means of any of its compounds which are or may be employed as fuel, such as carbonic oxide, carburetted hydrogen, &c. This operation forms the first stage of the manufacture. The second operation consists in removing, by means of sulphuric acid, the iron which has been reduced by the first part of the process. The remainder of the process of manufacture is similar to that which is now in use, viz., to heat the residue obtained by this improved process, in contact with carbonate of potash, and either with or without saltpetre.

In carrying out this process practically, Mr. Booth takes the chrome ore and grinds it to a powder by the usual mechanical means. This powdered ore he mixes with about one-fifth of its weight of powdered charcoal, and places it upon the hearth of a reverberatory furnace, constructed like the reverberatory furnaces used for puddling iron; that is to say, in such a manner that the heat or flame may be as free as practicable from uncombined oxygen or atmospheric air. By this operation the greater part or all of the oxide of iron in the chrome ore will be decomposed, and the iron reduced to the metallic state. When one charge of the mixture has been reduced, as above described, it is to be raked out, and a second charge of the mixture introduced into the heated furnace; this is reduced in its turn, and replaced by a third charge, and so on. Each charge, when raked out of the furnace, is to be thrown into vats containing dilute sulphuric acid, whereby the iron is dissolved and a solution of proto-sulphate of iron or copperas is thereby formed. This solution (still containing free acid) is to be drawn off and run upon a fresh charge of reduced ore, in order more fully to saturate the free acid, after which it is again to be drawn off, evaporated and crystallized so as to produce copperas in a state adapted for the market. The residue in the vats is then to be well washed with water and dried, and afterwards mixed with carbonate of potash, or with carbonate of potash and saltpetre, and heated in the same manner that chrome ore itself is heated in the process usually employed.

Mr. Booth states the advantages of his improved process to be as follows :—By the ordinary method of manufacturing chromate and bichromate of potash, only a portion of the chrome ore is oxidized, and consequently only a portion of the material is converted into chromate of potash by a single heating; repeated heatings, with fresh portions of potash, being required to complete the process. These repeated heatings with potash involve a considerable loss of that salt by volatilization, but by the employment of the improved process, the first heating with carbonate of potash converts all or nearly all the oxide of chrome into chromate of potash, and thus much of this loss by volatilization of the potash is avoided. The production of copperas, incidental to the new process, also assists in defraying the expense involved in carrying out the improvements. The quantity of sulphuric acid employed in this process is nearly equal in weight to two-thirds of the weight of the ore itself.

Manufacture of Chromate of Lime.—M. Jacquelain's process for obtaining chromate of lime, and thence by double decomposition the chromates of soda, potash, and lead, is as follows :—Mix together in a cylinder moving on its axis chalk and chrome ore, both previously reduced to a fine powder and sifted through very fine sieves, for it is important to the success of the operation that the ingredients be reduced to an impalpable powder; then calcine the mixture for nine or ten hours at a red heat on the hearth of a reverberatory furnace, taking the precaution to keep the mass about two inches in depth, and expose the whole of it ten or twelve times to the surface. After a short time, if the flame has been sufficiently oxidizing, the change of oxide of chrome into chromate of lime will have been accomplished, which may be known by the mass assuming a greenish-yellow colour, and becoming soluble in hydrochloric acid, with the exception of the silicious particles. Take this porous and friable mass, grind it, wash the powder in hot water, and to the liquid, kept continually agitated, add sulphuric acid until the liquor reddens litmus. A total conversion of the chromate of lime into a bichromate is thus effected, together

with the formation of a small quantity of sulphate of iron. To this liquor add milk of lime, for the purpose of separating the iron. The bichromate of lime undergoes no change. After a short time allowed for settling, draw off the clear supernatant liquor, which contains only bichromate of lime and a very little sulphate of chrome. In this state it can be at once made use of to produce the bichromate of potash, the chromates of lead, neutral or basic, and even the chromate of zinc.

It is found by the use of this process that it is not necessary to convert the bichromate of lime into bichromate of potash in order to procure the insoluble chromates of lead, zinc, baryta, &c., which fact causes a great economy in the preparation of these products, as it suffices simply to make a double decomposition between the bichromate of lime and the acetate of lead, the chloride of zinc, &c. As to the bichromate of potash, it may be produced not less easily and quite pure, by adding a solution of carbonate of potash, free from soda, to the bichromate of lime, whence results an insoluble carbonate of lime, easy to wash, and bichromate of potash in solution, which may be concentrated and crystallized, free from organic matters, and without the liberation of hydrochloric acid.

M. Jacquelain states the following to be some of the practical advantages of his process over the old method of obtaining bichromate of potash:—(1.) The necessity of continually looking after the workmen is avoided, and the frequent renewal of the surface of the materials by means of rakes not required, this continual stirring being necessary to bring the chrome ore constantly into contact with the oxygen of the air, its greater density causing it to remain at the bottom of the potash salt in fusion. (2.) The rapid and extensive wear and tear of the floors of the furnace is avoided. It is true that the simultaneous employment of potash and lime, now adopted in some works, or what is still better, the employment of lime, saltpetre, and oxide of manganese, tends considerably to facilitate the admixture of the ingredients in the furnace, and thus to prevent the rapid wear and tear to which the floor of the furnace was subjected. But both of these processes afford mixtures of a pasty consistence, and the air can act only on the surface of the agglomerated particles. In the new process the floor of the furnace undergoes no material wear. (3.) Whichever mixture was adopted there was always a loss of from eight to nine per cent. of potash, at the temperature of a bright red heat. With the employment of chalk no loss of this kind occurs. (4.) The loss of potash in the state of silicate was still greater, and the presence of silica was a great impediment to crystallization. (5.) The difficulty of knowing when to stop at the exact moment of the conversion of the chromate into bichromate is done away with. If too much sulphuric acid be added, chromic acid is set at liberty, and during the concentration of the liquors the organic matters burn at the expense of its oxygen, whence results a green and uncrystallized sulphate of chrome, which gives a brown colour to the bichromate of potash, insomuch that it is necessary to evaporate it to dryness, and to calcine the entire mass afresh. All these difficulties are got rid of by the adoption of the new process. (6.) The incomplete pulverization of the chrome ore multiplies the number of calcinations, retards the chemical actions, and consequently increases very considerably the consumption of fuel. "I cannot," says M. Jacquelain, "insist too much on the necessity of the extreme division of the chrome ore, and, in fact, it would be advisable to levigate it and dry the powder by means of the waste heat of the furnace."

Adulteration of Bichromate of Potash.—A mixture of sulphate of soda and chloride of sodium, coloured with a strong solution of chrome, has been offered for sale as the genuine article. To detect these adulterations, first ascertain the quantity of moisture contained in the sample, by weighing out a certain portion and drying it on a sand-bath, and again weighing; the loss of weight will give the quantity of water. Then dissolve it in distilled water, and add any soluble salt of lead until it ceases to give a precipitate. The mass is then to be boiled, and more distilled water added; the supernatant liquor is next poured off, and if the sample under examination contains any chloride of sodium, small shining crystalline needles of chloride of lead will form in the liquor as it cools. The remaining precipitate is then to be treated with strong nitric acid, which will decompose the chromate; by adding distilled water, the nitrate of lead formed by the decomposition of the chromate of lead will be dissolved, and the remaining sulphate of lead, if any, may be dried, and its weight ascertained, from which the quantity of sulphate in the chromate may be

calculated. If it be required to ascertain the quantity of the chloride, this may be done by redissolving the chloride of lead by means of heat, and operating on it by any of the soluble salts of silver.

M. Zuber's mode of ascertaining the presence of sulphate and muriate of potash in bichromate of potash, is as follows :—Add a large excess of tartaric acid to the chromate of potash to be tried, the chromate will be decomposed, and acquire in about ten minutes a deep amethyst colour. It will now, if pure, form no precipitate with the nitrates of baryta or silver, by which means the presence of muriate or sulphate of potash may be readily ascertained.

Methods of Ascertaining the Value of Chrome Ores.—As it is of great importance to the manufacturer of chrome salts that he should possess a ready means of ascertaining the value of the chrome ores on which he operates, we subjoin Professor Calvert's "new method for the analysis of chrome ores."

Professor Calvert first calls attention to the objections inherent in the present mode of attacking the ore, the first of which consists in the difficulty of obtaining crucibles capable of resisting for several hours, at a high temperature, the combined actions of nitrate and carbonate of potash, but more especially of caustic potash, which it is essential to the operator to employ in order to properly attack his ore. Silver crucibles cannot stand the temperature, and those of porcelain and platinum are either dissolved or injured.

The second and most serious objection to be raised is, that owing to the high specific gravity of the ore, it falls to the bottom of the fused mass, and thus becomes excluded from the necessary oxidizing action of the atmosphere to transform the oxide of chromium into chromic acid. As the chromic acid is thus produced but very slowly, the consequence is, the ore is very imperfectly attacked, although the calcination be continued for several hours.

"The first method," says Professor Calvert, "I have employed with success, consists in mixing intimately a given quantity of the well pulverized ore with about three or four times its weight of a mixture made by slaking quicklime with caustic soda, and then drying and calcining the mass. To the intimate mixture of soda, lime, and ore, one-fourth part of nitrate of soda is added. The whole is then well calcined for two hours, taking great care to stir the pasty mass every quarter of an hour with a platinum wire. In consequence of this mixture not becoming fluid, the ore is constantly kept in contact with the oxygen of the atmosphere, and thus becomes decomposed, and the oxide of chromium oxidized. I find that by this method one treatment is generally sufficient to completely attack the ore. It is seldom that two treatments are necessary, whilst, by the method usually adopted, five or six calcinations are required. Henry Rose states that these calcinations may be avoided by weighing the remaining residuum or ore not attacked, and then calculating the chrome in it from that which has been acted upon; but this mode would lead to incorrect results, for chrome ore always contains silica and alumina, which are easily dissolved in the first operation.

"The greater part of the mass is now dissolved in water, and to the insoluble portion, sulphuric acid, diluted with twice its bulk of water, is added. When the whole is removed from the crucible, a little alcohol is added to the solution, which renders the sulphate of lime nearly insoluble. The whole is next thrown on a filter and washed three or four times with weak alcohol, which dissolves all the bichromate formed, leaving the sulphate of lime with the ore not attacked on the filter. The former is easily removed by washing the filter with boiling water. If any ore is left as a residuum it is recalcined. The solution containing the bichromate of soda is now neutralized with ammonia, and oxalate of ammonia added, which gives rise to a small precipitate of sesquioxide of iron, alumina, and oxalate of lime, together with a little silica dissolved by the excess of sulphuric acid. The precipitate having been separated and well washed, the liquor is either boiled with alcohol to reduce the chromic acid to the state of oxide to be precipitated and valued ; or the liquor is rendered acid, and the amount of chromic acid is ascertained by protochloride of tin, according to Dr. Penny's process.

"The two following analyses of an ore from Turkey were made by this method:—

Sesquioxide of chromium	57.60	58.40
Protoxide of iron	25.78	26.14
Sand, clay, chalk	17.50	16.35

Another process which I have found to produce also good results, consists in calcining the well pulverized chrome ore with nitrate of baryta, the oxygen of which, as it leaves it, gradually oxidizes the oxide of chromium. From time to time, towards the end of the operation, a little caustic potash is added, which facilitates the action and gives rise to chromate of potash. The transformation of the oxide of chromium into chromic acid is nicely effected by the pasty state of the fused oxide of barium preventing the ore falling to the bottom of the crucible, and thus becoming excluded from the oxidizing action of the atmosphere. On cooling, the crucible and its contents are put in contact with dilute nitric acid, which dissolves the greater portion of the mass, leaving the non-attacked ore. This residuum, after being washed, is ready for a new treatment if deemed necessary. The liquor containing the bichromates of soda and baryta, nitrate of baryta, peroxide of iron, alumina and lime, is first heated with sulphate of potash, which precipitates the baryta in the state of a sulphate. The precipitate is thrown on a filter and washed; and to the filtrate, ammonia and oxalate of ammonia are added, on which peroxide of iron, alumina, and oxalate of lime fall down. The mixed precipitate is gathered on a filter, washed, and the chromium in the chromate determined."

Mr. Watt's process for ascertaining the quantity of oxide of chromium contained in a sample of chrome ore is as follows :—Take a given weight of the ore, say 200 grains, previously reduced to a fine powder, and intimately mix it with twice its weight of nitrate of potash or soda, adding a little slaked lime to prevent it from fluxing; place the mixture in an iron crucible, and subject it to a strong red heat for abour three or four hours, then treat the mass with water to dissolve out the chromate. The insoluble matter having been washed several times until the water has ceased to come off coloured, the washings are to be added together and evaporated to concentrate the solution. This being done, it is to be treated with an excess of dilute sulphuric acid to liberate the chromic acid, and then treated with spirit of wine, by which the chromic acid will be reduced to the state of green oxide, which will remain in solution in the preponderance of sulphuric acid employed. A solution of caustic ammonia in excess is then to be added, which will precipitate the oxide of chromium. The mass is then boiled to evaporate the superabundance of ammonia. It must now be passed through a filter to collect the oxide, and a little fresh water poured on it to free it from any saline matter ; then gently dry on the filter, when it may be entirely removed with ease, as the oxide, which was previously of a bulky nature, contracts very considerably. It may then be subjected to a dull red heat in a silver platinum or porcelain crucible, and afterwards its weight ascertained, from which the percentage of oxide of chromium which the ore contains, and, consequently, the amount of sulphate required to convert it into a chromate, may be calculated.

The sample to be analysed should be taken from the bulk after it has been ground, so that it may be a fair average. In practice the manufacturer may ascertain whether the process is complete by taking a sample out of the furnace, and treating it with a slight preponderance of dilute pure nitric acid, then adding chloride of barium. If, on this addition, much precipitate of sulphate is formed, the operation is not completed ; but if, on the other hand, only a slight milkiness is produced, the "batch" may be considered as finished.

(*To be continued.*)

DURABILITY OF HYDRAULIC LIME AND CEMENT

UNDER THE INFLUENCE OF SEA-WATER.

Malaguti and Durocher* have instituted observations as to the action of sea water upon mortar, and come to the conclusion that it is much more complicated than is generally supposed. Analyses indicate that it is not always of the same character, for the substitution of magnesia for lime, which is usually regarded as the cause of alteration in the mortar, does not always take place; moreover, this substitution is only partial, and as it is accompanied by an absorption of carbonic acid, the mortar resulting from such alteration consists of a hydro-silicate of alumina and a dolomitic carbonate. But it frequently happens that the lime is removed without

* *L'Institut*, July, 1854.

any substitution of magnesia, and then the change in sea-water is precisely similar to that which takes place in carbonated fresh water.

In the alterations of an average hydraulic mortar there is a partition of the elements into two compounds, the one rich in earthy carbonates, the other rich in alumina, and forming a snow-like coating upon the surface of the mortar. This alteration takes place but slowly in mortar and cement which are very hard.

The alteration experienced by these consists in a cracking of the whole mass, with abstraction of a small quantity of lime, which may or may not be replaced by magnesia. In both cases, however, the mass contracts, and is, consequently, cracked throughout.

The authors found in all the cements which resist the influence of sea-water a considerable percentage of peroxide of iron. The cement of Vassy and Poully contains about 7 per cent.; and Parker's cement, the most durable of all, 14 per cent. of this substance. This peroxide of iron the authors consider to contribute essentially to the durability of the mortar under the influence of sea-water. They prepared several sorts of puzzolano with silica, lime, peroxide of iron, and alumina, and studied the action of lime-water upon these mixtures after having been heated to dull redness. They found—

1. That the quantity of lime precipitated is independent of the presence of alumina, while it increases on the presence of peroxide of iron.

2. That the constituents are separated into two groups, one of which passes into the liquid, the other remains in the hardened mass that falls to the bottom of the vessel. The flocculent product which passes into the liquid is richer in alumina, the other part richer in peroxide of iron; whence the authors infer that it is this peroxide of iron which gives durability to cements and hydraulic lime. The authors are therefore of opinion, that, for marine work, such limestone and puzzolano should be selected as contain oxide of iron, and that hydraulic lime or cement should be mixed with peroxide of iron.

SOURCE OF SILICA IN CARBONATE OF POTASH OBTAINED BY CALCINATION OF THE BITARTRATE.

Carbonate of potash prepared from the bitartrate is seldom quite free from silica; the solution neutralized with hydrochloric acid, evaporated to dryness and redissolved in water, presents to a greater or less degree the turbidity indicative of silica. This impurity may originate either from the presence of silica in the bitartrate employed, or from the vessels in which the calcination is effected. To determine this point, pure bitartrate of potash was calcined in a platinum capsule, and contact with glass or porcelain carefully avoided in the subsequent extraction with water, &c. The salt thus obtained did not afford any indication of silica when subjected to the usual test. The same bitartrate of potash calcined in an earthen crucible gave a product which, when tested for silica, presented a distinct flocculent deposit of silica. This was likewise the case when a porcelain crucible was used for the calcination, and even when a platinum crucible was used for the calcination the carbonate was found to become contaminated with silica when the extraction was effected in glass or porcelain vessels.—*Neues Repertorium für Pharmacie*, vol. iii., No. 3.

REMARKS ON THE DETECTION OF ARSENIC IN CASES OF POISONING.

L. A. Buchner* has pointed out some details of manipulation relating to the detection of arsenic. The method to which he gives preference is that based upon the direct conversion of arsenious acid by reaction with chloride of sodium and sulphuric acid into the volatile chloride of arsenic, a state of combination in which arsenic may be very readily recognised by Marsh's test. The use of chloride of sodium and sulphuric acid is also advantageous, because the exclusion of adventitious arsenic is more certain than when specially prepared hydrochloric acid is used.

In adopting this method of separating arsenic, it is requisite that an excess of chloride of sodium should be used, so that the sulphuric acid may not react with

* *Neues Repertorium für Pharmacie*, 1855.

organic substances, and give rise to the production of sulphurous acid, which would interfere with the tests to be applied subsequently.

However, Buchner found that in despite of this precaution, the distillate, though without any smell of sulphurous acid, always gave, when subjected to Marsh's test, instead of the true metallic deposit, a yellow ring of sulphide ; and as the zinc used was free from sulphur, he inferred that the sulphur must originate from sulphurous acid, which, reacting with nascent hydrogen, is converted into sulphide of hydrogen. The same result would be produced when the zinc used in Marsh's test contains sulphur.

Before applying Marsh's test to the acid distillate, which would contain the arsenic as chloride, the absence of sulphurous acid must be provided for. This may be easily done by adding a few grains of pure chlorate of potash, until, when the liquid is gently warmed, chlorine is evolved ;—or the formation of sulphurous acid may be prevented in the first instance by mixing with the chloride of sodium a small quantity of chlorate of potash.

The latter method is the better of the two, because decomposition of organic substance is effected in a greater degree by the chlorine generated, and in consequence of that the conversion of the arsenic into chloride is rendered more certain.

Even the sulphuric acid used in Marsh's test may contain sulphurous acid ; in which case it should, when diluted, be mixed with a little chlorine water, and boiled until the excess of chlorine is separated.

When for testing the metallic deposit, obtained by Marsh's test, the reaction with sulphide of hydrogen is applied, particular care must be taken that the heat applied is only just sufficient to effect the formation of sulphides of the arsenic or antimony; for when, by the application of too high a temperature, sulphur is liberated and mixed with the metallic sulphide, the indications furnished become fallacious. Thus, on the one hand, sulphide of antimony may be so affected by an admixture of sulphur as to resemble in colour sulphide of arsenic, and to remain undissolved by hydrochloric acid gas ; while, on the other hand, sulphide of arsenic may, from the same circumstance, be only partially dissolved by ammonia.

With regard to the customary limitation of the search for arsenic, in cases of suspected poisoning, to the stomach and its contents, Buchner is of opinion that it is insufficient to justify an opinion when negative results are obtained. In one instance he found that though arsenic was present in the stomach and duodenum only in such amount as to be barely recognizable, still, when different parts of the intestinal canal were examined, arsenic was found without difficulty. The lower portion of the intestine contained a tolerable quantity of slimy substance, coloured yellow by bile ; and here the arsenic was found in largest amount ; while in the upper portion of the intestine, which was empty like the stomach, the amount of arsenic was smaller. The author considers it not improbable that in this instance arsenic had been absorbed and excreted by the liver into the intestine.

PURIFICATION OF ARSENICAL SULPHURIC ACID.

L. A. Buchner* recommends the separation of arsenic from sulphuric acid as chloride of arsenic, which is volatilized at a temperature much below the boiling point of sulphuric acid, and is very readily formed by the joint reaction of arsenious acid with hydrochloric and sulphuric acids.

The sulphuric acid to be purified is heated, and a moderate current of hydrochloric acid gas passed into it. The author states that the separation of arsenic by this method is perfect, and easily effected, even when it amounts to considerably more than is usually met with in the sulphuric acid obtained from pyrites. It would therefore have the advantage over the method of distillation, which is imperfect, because the temperature at which arsenious acid volatilizes is too near the boiling point of sulphuric acid, and also, over the method of precipitation as sulphide of arsenic, which is extremely operose. Moreover, it may perhaps have the merit of ensuring the separation of the nitrous acid usually present in crude sulphuric acid.

---

* *Neues Repertorium für Pharmacie*, No. 3, 1855.

METHOD OF TESTING ARCHIL.

Mr. Leeshing* has found that archil is sometimes adulterated with logwood extract. He states that as a test for this adulteration, dyeing a strip of calico mordanted for madder red or chocolate is not altogether satisfactory, and chiefly because archil itself is fixed in this way to some extent, particularly when the mordant is somewhat concentrated.

When the amount of logwood extract in archil is considerable, it will be indicated, on the addition of alum or protochloride of tin, by the shade of colour produced, as compared with pure archil treated in the same manner. These reactions, however, are not decisive, and are of value only when taken together with others.

When pure archil (fifty drops), diluted with a considerable amount of water (three ounces), and slightly acidified by means of acetic acid, is mixed with fifty drops of fresh solution of protochloride of tin (one part of the salt in two of water) and heated in a flask upon a sand-bath, the colour is almost entirely destroyed when the liquid is at the boiling point, presenting only a yellowish tinge.

A drop of logwood extract diluted with three ounces of water and treated in the same manner produces a distinct violet, which remains unaltered after several hours' boiling.

This violet colour produced by logwood extract is somewhat modified in the presence of a large proportion of archil; but Mr. Leeshing has found that it is capable of indicating the presence of logwood, even when it does not amount to more than three or four per cent. of the archil. The boiled liquid has then a permanent grey tint.

When the adulterating substance is extract of lime-wood or of sapan-wood the boiled liquor retains a red tint.

The colour of the archil is gradually restored in the boiled liquid by exposure to the air, and by the addition of alkali, while on the contrary the colour produced by logwood is destroyed only by an alkaline solution of tin, and is restored by acids.

For estimating the relative amount of pigment in samples of archil, Mr. Leeshing recommends the colorimetric method and a verification by the dye-test, since neither the reducing action of protochloride of tin nor the bleaching action of chloride of lime are applicable, in consequence of the variety of ingredients used in the manufacture of archil. Mr. Leeshing points out another fact which renders either proceeding fallacious, which is, that the distinction between *blue* and *red* archil is not owing to the presence of a greater amount of alkali in the former, for he was unable to convert red archil into blue by any amount of alkali. Moreover, blue and red archil acidified with equal proportions of acetic acid communicated different colours to wool; contrary to what might have been expected, the latter gave a dull bluish red, while the former gave a scarlet.

Mr. Leeshing finds that blue archil, when mixed with a small quantity of red prussiate, acquires all the properties of the red archil. The presence of red prussiate does not interfere with the above method of testing for wood extracts.

ACIDIFICATION OF FATS UNDER THE INFLUENCE OF SUBSTANCES ASSOCIATED WITH THEM IN SEEDS, &c.

M. Pelouze† has made a series of experiments on the spontaneous acidification of fats. The oleaginous substances upon which he operated were rape, poppy, mustard, sesame, cameline, chamomile, and linseed; nuts, walnuts, sweet and bitter almonds.

In the first instance he ascertained by numerous experiments that, when the oil is extracted from the seeds, either by pressure or by solution in ether or benzole, *immediately* after they are crushed or ground, the fat is obtained in a perfectly neutral state. This agrees with the general opinion as to the state of combination of fat acids and glycerine in plants.

When the meal of any one of these oleaginous substances is kept for some days, even in earthen vessels, closed with corks, a notable proportion of the fat is

---

* *Chemical Gazette*, No. 303, 1855.

† *Comptes Rendus*, No. 12, 1855.

decomposed into fat acid and glycerine, and this decomposition progresses for several months.

The crushed seeds were preserved in closed vessels, and there was every ground for the opinion that atmospheric air exercised no influence upon this reaction.

Thus, walnuts crushed, and immediately introduced into glass bottles, completely filled, and kept for five days at a temperature varying from 50° to 77° F., yielded oil, containing in one instance 9 per cent., and in another 15 per cent. by weight of fat acid. Sesame oil gave after eight days 6 per cent., and after three months 47.5 per cent. of fat acid. Poppy oil gave similar results. Oil of sweet almonds gave, after three weeks, oil containing 3.5 per cent. of acid. Ground nut oil, after one month, gave oil containing 6 per cent., and after three months 14 per cent. of acid. Linseed and rape oils, after three weeks, gave oil containing from 5 to 6 per cent.

The acidification appears, moreover, to vary in intensity not only in proportion to the temperature, but likewise in proportion to the quantity of oleaginous substance.

The author has not found any oil completely acidified in this way, although the greater portion of some oils is acidified within a few months.

The cakes obtained in the extraction of oils on a large scale all contain fat acids, and when old they frequently do not contain any neutral fat. It might be interesting to examine how this change influences the value of such cakes for feeding cattle. Oil cake contains on the average 10 per cent. of the oil, and there is reason to suppose its neutral or acid state would be of some influence.

When crushed seeds are moistened with water, putrefactive fermentation ensues within a few days, and a strong ammoniacal odour is evolved. However, less fat is acidified in this way than when the dry crushed seeds are kept. It would seem that the ferment, or the organic substance which induces the acidification of the fat, is decomposed too rapidly. The author has been unable to isolate this substance.

It was observed, in the course of these experiments, that the sugar of walnuts, nuts, sweet and bitter almonds, is identical with cane sugar, and that there is no trace of glucose in them. Almost the whole of the sugar remains in the oil cake, and it may be converted into alcohol by fermentation.

These facts have a practical value. Thus, for instance, linseed meal will contain neutral or fat acid, according as it is fresh or old, and its applicability in medicine be very different. Milk of almonds, when fresh, contains neutral oil, within twenty-four hours acidification commences. Oils used as food will have a different flavour, according as they are prepared from freshly crushed seeds or the reverse.

ALTERATION OF SUGAR DISSOLVED IN WATER.

E. Maumene* has found that cane sugar experiences the same change into uncrystallizable sugar, when kept for a long time in solution, as when heated with acids. A crystal of pure sugar dissolves in boiling potash without any coloration ; but a solution of the same sugar after being kept for any considerable time becomes brown when boiled with potash, thus showing that the sugar has undergone change. —The progress of this change is best observed by means of the saccharometer. The dextrogyration decreased most rapidly with a solution of pure sugar, and was less when the solution contained some lime, which appears to retard the change. The rapidity of the change is increased by heat.—Glucose or gum do not, under the same circumstances, suffer any alteration. The presence of organic acids was found to exert but little influence upon the alteration of sugar.

From these observations the author concludes—1. That the roots of beet will yield less crystallizable sugar the longer they are kept ; 2. That a diminution of crystallizable sugar must result from the method of drying the roots ; 3. That the percentage of sugar in old syrups cannot be ascertained by means of the optical test ; 4. The brown colour produced by heating syrup with potash cannot alone be taken as an indication of the presence of glucose, since the uncrystallized cane sugar presents the same reaction.

When the cane sugar in syrup which is old, or which contains gum, is to be estimated, this must be done by evaporation over lime or sulphuric acid. The cane sugar then crystallizes out, and the point at which the gum begins to dry may be very well observed. When the syrup contains glucose instead of cane sugar no crystals, or very few, are obtained.

* *Comptes Rendus*, xxxix., 914.

OCCURRENCE IN URINE OF A BLUE SUBSTANCE RESEMBLING THE COLOURING SUBSTANCE OF INDIGO.

H. Sicherer* has been engaged in the examination of the blue substance observed in urine by Hassall, and previously by Heller and Dumas.

He found that the urine in which it was produced did not present any abnormal character with regard to the amount of uric acid, urea, chloride of sodium, phosphates, &c. Bile could not be detected, and the colour was the usual pale yellow. Sometimes it was turbid, and deposited mucus as well as a sediment, which the microscope showed to be urate of soda. Variation of diet produced no sensible effects.

The presence of the blue substance was not indicated by spontaneous deposition from the urine either while fresh, or when allowed to stand, as is always the case in Bright's disease. But on the addition of a large quantity of acid the urine gradually became reddish-brown, and ultimately opaque, when the blue substance appeared either after shaking as a deep blue froth, or after standing a while as a thin reddish-blue irridescent film.

The coloration of the urine with sulphuric acid is particularly marked, extending downwards from the surface, and in such a case the gall reaction of Pettenkofer may lead to error.

After forty-eight hours' rest no more blue substance was separated from the urine by acids, even after previous evaporation in an atmosphere of carbonic acid.

The dry-washed substance is deep blue, acquiring a bronze colour when rubbed. It is insoluble in water, cold or boiling, dilute acid or alkalies; but is dissolved by boiling alcohol, and more copiously by ether; the solution is blue, and on cooling deposits the greater portion of the substance as a blackish-blue powder, while the liquid retains a violet or reddish tinge. On evaporating the alcoholic solution it became reddish-brown, and left a shining varnish upon the powder.

The substance agrees with indigo blue, especially in being volatilizable. At 536° F. it is converted into a purple vapour, and the greater part sublimes without decomposition as brilliant transparent purple prisms and needles, which are insoluble in water, alcohol, and ether. In this state it is not distinguishable from sublimed indigo blue.

With regard to its composition nothing further can be stated than that, together with nitrogen, it contains a large proportion of carbon.

It has a low density; with concentrated sulphuric acid it behaves like indigo blue; it is bleached by chlorine, but not by sulphurous acid; boiled with moderately strong nitric acid it gives a yellow solution. It is also bleached, in the presence of alkalies or alkaline earths, by oxidizable substances, such as protoxide of iron, sulphurous acid, sulphuret of ammonium, &c., and may be reproduced from the alkaline solution by exposure to the air, or by addition of hydrochloric acid.

In these characters the substance corresponds both with indigo blue and the cyanurin or urecyan described by Heller. Elementary analyses of the latter do not exist, and that of the blue substance from urine cannot be made until it is obtained in sufficient quantity and of sufficient purity.

ON GUM MEZGNITE.

BY CAMPBELL MORFIT, M.D.

Gum mezgnite, known synonymously as *muckeet*, *mezgneet*, and *musgnit*, and recently presented to public notice by Dr. G. G. Shumard, U.S.A., is said to be the product of a tree flourishing extensively in the high and dry regions of the plains of Western Texas, New Mexico, and the adjacent Indian territory. The facility with which it may be obtained in large quantities, and its very probable prospective value as an article of commerce, give it an interest that led me to a chemical examination which I have caused to be made in my laboratory by one of my students, Mr. Fred. W. Alexander.

It is a spontaneous semifluid exudation, concreting by exposure into tears and lumps of variable size and form. One sample, which was a part of that brought in by Dr. Shumard, and obtained directly from the U.S. Bureau of Indian Affairs,

---

* *Annalen der Chemie und Pharmacie*, April, 1854.

consisted of small irregular pieces and rounded balls about the size of a hazel-nut, semi-transparent, and shading in colour from a lemon-white to a dark amber. When broken, the fractured faces were brilliant, and the gum was easily reduced under the pestle into a dull white powder. One of the balls was enveloped with an outer pellicle of gum about one-sixteenth of an inch in thickness.

The specific gravity of the gum was 1.5; but this determination may possibly admit of correction upon purer samples than were disposable for the experiment.

Its proximate composition was found to be—

Water	11.640
Foreign matters	0.236
Bassorin	0.206
Arabin	84.967
Ash	3.000
	100.049

Cerasin was also sought, but not found. The ash was estimated by burning a given quantity in an atmosphere of oxygen, and weighing the residue.

The ultimate analysis, made also by effecting combustion of the carefully dried gum in oxygen gas, yielded, in two separate experiments, the following numbers:—

	I.	II.
Carbon	43.63	43.10
Hydrogen	6.11	6.50
Oxygen	47.26	47.40
Ash	3.00	3.00
	100.00	100.00

These proportions approximate very closely to those obtained from gum Senegal and Arabic, by Guerin and Mulder. The general appearance, too, of the gum is similar to that of gum Senegal and the dark inferior qualities of gum Arabic. In chemical properties also it is allied to them, being insoluble in absolute alcohol, partially soluble in common alcohol, and readily forming with hot or cold water a very adhesive mucilage. It is, in fine, a true gum, and promises, in its physical and chemical behaviour, much of the advantage expected by its discoverer as an economical substitute for gum Arabic or Senegal.—*Chemical Gazette*, No. 297, 1855.

CLARIFICATION OF RAPE OIL.

Dr. Rudolph Wagner* has found that a solution of chloride of zinc may be advantageously substituted for sulphuric acid in the clarification of rape oil. His experiments were made on a small scale; the chloride solution was syrupy, 1.85 sp. gr., and was used in the proportion of $1\frac{1}{2}$ per cent. of the crude oil. This mixture was shaken, and at first the oil became yellowish, then dark brown, and after a few days a dark brown flocculent deposit collected at the bottom of the vessel. The oil was still turbid, but by adding hot water and passing through it a current of steam, it was rendered clear, and the chloride of zinc was separated.

The price of chloride of zinc fit for this purpose would be so much less than that of sulphuric acid, that the practical applicability of the one substance as a substitute for the other, becomes a question of interest.

Dr. Wagner likewise finds that the pigments of madder are not decolorized or altered by chloride of zinc solution, and as ligneous substance is decomposed by that reagent, there is a probability that it may be applicable for the preparation of madder as a dyeing material.

PREPARATION OF A GREEN PIGMENT ANALOGOUS TO SCHWEINFURT GREEN WITH BUTYRIC ACID.†

When butyric acid is neutralized with freshly precipitated carbonate of copper, and the solution mixed with a boiling saturated solution of arsenous acid, a yellowish-green amorphous precipitate is formed, which after some time becomes

* *Neues Jahrbuch für Pharmacie*, January, 1855.

† Wöhler, *Ann. der Chem. und Pharm.*

crystalline, and acquires the fine green colour of ordinary Schweinfurt green. It likewise resembles it in other characters. Analysis shows, however, that it contains for an equivalent of butyrate of copper only two equivalents of arsenite, while the acetic acid compound contains three equivalents of the latter. The butyric acid compound is therefore $CuO, Bu+2CuO, AsO_3$, and contains

Oxide of copper	30.5	30.06
Arsenous acid	50.1	49.98
Butyric acid	19.4	19.96

THE POSTAGE ON NEWSPAPERS AND BOOKS.

By a Treasury warrant published in the *Gazette* of June 5th, the former warrant of January 23, 1855, is repealed, and the following rates of postage and regulations are substituted. It is a subject of considerable importance to literary and scientific societies, and it was thought a short abstract of the warrant would be useful to our readers :—

All packets, consisting of books, publications, or works of literature or art posted in the United Kingdom, may be transmitted by the post within the United Kingdom, subject to the several rates and regulations hereinafter contained, that is to say,—

On every such packet, if not exceeding four ounces in weight, there shall be charged and taken one uniform rate of postage of one penny;

Exceeding four ounces, and not exceeding	eight ounces			twopence
"	eight ounces,	"	"	one pound ..... fourpence
"	one pound,	"	"	one pound and a half, sixpence
"	one pound and a half	"		two pounds ..... eightpence

and for every additional half-pound above two pounds in weight, or fractional part of such additional half-pound, an additional rate of postage of twopence.

No such packet in length, width, or depth, to exceed the dimensions of two feet. Postage to be paid at the time of being posted, not in money, but by being duly stamped with the proper postage stamps affixed thereto, to appear outside of every such packet, near the address or direction. The terms "books, publications, or works of literature or art," to mean, comprise, and include all books (whether printed, written, or plain), publications or compilations (whether in print or in manuscript), almanacks, prints, maps (whether on paper, or canvas, or cloth, and whether printed or written), and any description of paper, parchment, or vellum (whether printed, written upon, or plain, or any mixture of the three), together with any binding, mounting, or covering of or upon, or belonging to any book, or publication, or work, or any portion thereof, or belonging to any paper, parchment, or vellum, and any cases or rollers of prints or maps, book-markers (whether of paper or otherwise), pencils, pens, or other articles usually appertaining to any such book, publication, or work, paper, parchment, or vellum, or necessary for its safe transmission, except where any such packet shall be transmitted by the post, upon or in respect of which a less rate of postage than a *minimum* rate of fourpence shall be paid, and in all cases where any such packet shall be transmitted by the post upon or in respect of which a less rate of postage than a *minimum* rate of fourpence shall be paid ; every such packet shall consist of and comprise all such before-mentioned books, publications, or compilations, almanacks, prints, maps, paper, parchment, or vellum only as shall be printed or contain printed matter only (whether bound or unbound), and shall not comprise or extend to, or include any packet consisting of, or containing any writing (except the address), nor any cases or rollers of prints or maps, or book-markers, pencils, pens, or other articles.

Every such packet shall be sent open at the ends or sides, and shall not contain any letter either closed or open ; nor shall there be any letter or communication in the nature of a letter written or printed in or upon any such packet, or on the cover or envelope thereof, nor (unless a *minimum* rate of postage of 4*d.* shall be paid upon or in respect of such packet) any writing whatever written in or upon any such packet, or upon the cover or envelope thereof, except the address.

In order to prevent any obstacles to the due and regular transmission of letters, it shall be lawful for the officer of the post-office to delay for twenty-four hours the transmission of any such packet.

In cases of non-compliance with the regulations of this warrant, it is ordered and

directed that every such packet shall and may be detained and opened, and at the option of the Postmaster-General shall be either returned or given up to the sender thereof, or be given up to the person to whom it shall be addressed, or be forwarded to its place of destination ; and every such packet on being so returned, given up, or forwarded, shall be chargeable with a postage of double the amount to which it would have been liable, as a letter, if the postage had been paid by stamps when posted, and such double postage may be either paid by the sender or be charged to the person to whom such packet shall be forwarded. It is further ordered and directed that in every case in which the postage chargeable on any packet, under the provisions of this warrant, shall exceed the rate of postage to which any such packet would have been liable as a letter, no higher amount than the letter rates shall be charged thereon.

STAFFORDSHIRE COUNTY COURT.

Before R. G. Temple, Esq., Judge.

Dixon *v.* Bell.

This was a claim for £1 5*s.* for goods sold and delivered on the premises to the wife of the defendant.—Mr. Tennant appeared on behalf of the plaintiff, and Mr. Amos for the defendant.

The plaintiff being called, stated that he was a chemist and druggist at Hanley, and had practised as a professional dentist for fifteen years, and that in December, 1852, the defendant's wife, residing at Etruria, went to his shop complaining of violent pain, arising from her face and gums, and stated that she had been under treatment elsewhere, but had received no benefit, and that she should be glad if he would give her anything which would relieve her. He accordingly gave her a quinine mixture, for the purpose of allaying the irritation in the gums ; and having received benefit from it, she went several times afterwards.

Cross-examined by Mr. Amos.—He remembered an action being brought against him in the month of June, 1854, by the Apothecaries' Company, for practising without a certificate. The amount he sought to recover was due at that time. The defendant's wife was a witness in that action. He had frequently asked for a settlement of the account. She had never told him that the medicine was valueless.

Re-examined.—That bill had nothing to do with the one which was produced in the previous action.

Mrs. Dixon corroborated the evidence of her husband, the plaintiff in that action.

Mr. Amos submitted that the action was illegally brought, the plaintiff having given advice, and prescribed as an apothecary ; and cited sections 14 and 28 Geo. III., chap. 194, showing that a chemist could not recover for medicine. He also cited the Apothecaries' Company *v.* Greenhall, vol. xi. (new series), 155, Q.B.

Mr. Tennant, in reply, argued that the charges which formed the amount sought to be recovered in that action were confined to ordinary and usual charges for chemists, and not excessive in the least. The plaintiff appeared not only as an ordinary chemist, but as a professional dentist ; and he knew of no law which interfered with dentists' prescribing for cases appertaining to that profession. The specified items charged in the account were such as came within the province of one who was acting legally as a dentist, and at the same time reasonably.

His Honour observed that he would reserve judgment until the following morning, and in the mean time examine carefully the law upon such cases.

Thursday.

His Honour, on entering the Court this morning, according to announcement on Wednesday evening, delivered the following judgment in the case Dixon *v.* Bell :—

This action was brought for £1 5*s.*, the amount of certain quinine mixture, embrocation, and tooth powder, served to the defendant's wife ; who, upon going to the plaintiff's shop, was taken by him into a back room adjoining the shop, her mouth examined, and her case pronounced upon as wanting medicine, which he gave her to take. This was on the 13th of December. She went a second time, on the 17th, and said she was better, and he again gave her the same medicine to be repeated;

and again a third time on the 27th, and a fourth on the 19th of January. Upon each occasion the quinine medicine was given to her under the plaintiff's advice.

The plaintiff keeps a chemist's and druggist's shop, and also practises as a dentist; and the defence to this action is, that these things were given to the woman under the advice of the plaintiff as an apothecary, and that he cannot therefore recover for them, not being a certificated apothecary, under the 55th Geo. III., cap. 194; and I am of an opinion that if he acted as an apothecary, in supplying this woman with these things, he will be precluded from recovery for them under the 21st section of the Act; but a very difficult question arises in cases of this description—in what capacity this or that medicine is supplied—a question of equal importance, so far as there may be danger of crippling the usefulness of the chemist and druggist on the one hand, and of throwing down the barriers of security of safe and authorized medical practitioners on the other. The departments of these two classes—of apothecary, and chemist and druggist—approach so closely to each other, in some respects, that it is most difficult to draw the line; and this difficulty is much increased, because these have fluctuated and are fluctuating from their original types—the apothecary branches on the physician, and the chemist and druggist on the apothecary. There can be no doubt they are both compounders, preparers, dispensers, and vendors of drugs, medicines, and medicinal compounds. Unfortunately, no definition of an apothecary, or of the practice of an apothecary, is given in the Act; and, so far as it is defined, the definition greatly embarrasses. In the 5th section it runs thus :—"Whereas it is the duty of every person using the art and mystery of an apothecary, to prepare with exactness, and to dispense such medicines as may be directed for the sick by any physician;" but it is clear that something more must be contemplated in the practice of an apothecary; for such duty and more is stated in the proviso contained in the 28th section, as appertaining to the trade of a chemist and druggist, for that proviso enacts—"That nothing in that Act shall extend to prejudice or in any way affect the trade or business of a chemist and druggist, in the buying, preparing, compounding, dispensing, and vending drugs, medicines, and medicinal compounds," &c. And upon the best consideration I can give, I think the distinction is far more easily conceived than expressed: but I think it consists in the advice and responsibility under which medicine is prescribed or applied. I think a dispensing chemist and druggist is where medicines are made up and distributed by the advice and directions of the medical practitioners, and that when medicines are dispensed and sold by him to patients of his own, who consult him for that purpose, and buy the medicine from him under his advice, he then acts as an apothecary, and not a chemist and druggist. I would by no means be understood to say, that in no case can a chemist and druggist be asked for medicine suitable to a described malady. A man who has been drunk the night before may complain to a chemist and druggist that he has a headache, who may hand him an ounce of salts, a Seidlitz powder, or a bottle of soda water; or a woman may bring a child writhing with gripes, and he may hand her a bottle of this or that sedative. Each case must depend upon its own circumstances, and I think this case in itself draws a plain and intelligible distinction. I think the quinine mixture was advised and dispensed to the woman in the practice of an apothecary. I think the tooth powder and embrocation as clearly given to her in his character of dentist. In the former he clearly exercised the art and mystery of an apothecary, in the latter simply the art of a dentist. I shall therefore give judgment to the plaintiff only to the extent of those things which were vended by him as a dentist. Most of the cases turned upon the attendance of the practitioner upon the patients at their homes; but I think the mode in which this woman was taken to the plaintiff's consulting room, and the reiteration of such visits, were tantamount to such attendance; and its being internal medicine, prescribed and dispensed, and repeated, upon the advice, judgment, and responsibility of the plaintiff, tends to fix the character in which he acted. I come to this conclusion not without some considerable doubt and difficulty. But for the case of Apothecaries, Cree *v.* Gonough, 11 L. J., N. S., Q. B., 156, I should have thought Mr. Justice Maule's direction to the jury right, and that the proviso contained in the 28th section does go far to nullify the application of the Act to chemists and druggists. At the same time, I think the plaintiff shows but slight regard to the legal lesson taught in the former proceeding against him for penalties by bringing this action; but I must also say, that it is unfortunate for the

cause of morality when the law allows a defendant to be the cause of a man breaking or trying to evade the law, and has the benefit of advice and medicine so obtained, and then can save his pocket by refusing to pay for what he really has had—but so it is.

Mr. Tennant applied for costs, but his Honour refused to allow them.

PENALTY FOR SELLING DRUGS TO BREWERS AND PUBLICANS.

Two Excise informations were heard at the Longton Police Court, on Wednesday, 20th June, before T. B. Rose and J. Harvey, Esqrs., one of which, from the peculiar nature of the case, and the heavy penalty sought to be recovered, excited great interest in an unusually crowded court. In the first case, George Bentley, the landlord of the "Sir Robert Peel's Arms" beerhouse, Glebe Street, Stoke-upon-Trent, pleaded guilty to an information charging him with having in his possession grains of paradise and chiretta root for the adulteration of beer, and was fined in the mitigated penalty of £50. In the second case, Mr. Hollis, a Chemist and Druggist at Stoke, was charged with selling to George Bentley, the defendant in the preceding case, on the 4th of May, a quantity of grains of paradise and chiretta root, he well knowing that Bentley was a licensed brewer and reputed retailer of beer. Mr. Dwelly, solicitor to the Commissioners of Inland Revenue, attended to support the information; and Mr. Stevenson conducted the defence. Mr. Dwelly explained that the proceedings were taken under the Act 56 George III., chap. 58, sec. 3, which imposed a penalty of £500 upon any Chemist or Druggist, or other persons, selling to brewers or retailers of beer, grains of paradise, and various other things enumerated, for the colouring or adulteration of beer; the offence being created by such Chemist, Druggist, or other person knowing at the time of selling such articles that the party was a licensed brewer or retailer of beer, or reputed to be so licensed. George Bentley, the defendant in the previous case, was called as a witness. He stated that he was a licensed retailer and brewer of beer in Glebe Street, Stoke. He had known Mr. Hollis, the defendant, for two years. A few days before the 4th of May he went to Mr. Hollis's shop for some medicine for his wife, when he (the defendant) asked him if he was not a brewer? to which he replied that he kept the Peel's Arms. Mr. Hollis then told him that he had been to his house and had a glass of ale, and that it was not bad, but was not altogether the thing, and that he could give him something to improve it. On going to his shop a few days afterwards, Mr. Hollis told him that he would give him an American herb which would clear and improve the ale. Mr. Hollis then put his hand on a drawer, and said there was something there which would improve ale as well: he did not give it a name, but took some out and wrapped it up. The things resembled those now produced. Mr. Hollis told him to put them in the oven and stew them in a jar, upon which he took them home to his wife, and told her what to do with them. Mr. Askham came to his house the next morning and took away the jar, and afterwards Mr. Hollis came, and asked him if he had told Mr. Askham that he had been selling him grains of paradise? He said he had not, as he did not know they were grains of paradise. Mr. Stevenson, for the defence, urged a technical objection, which was overruled, and tried to throw discredit on the evidence. Mr. Rose, in delivering the decision of the bench, said that after paying the closest attention to the case, the magistrates could come to no other conclusion than that the charge was clearly proved, and they fined Mr. Hollis in the mitigated penalty of £125, which was the lowest sum to which they had the power of reducing it.

BOOKS RECEIVED.

MUSEUM OF ECONOMIC BOTANY, *or a Popular Guide to the Useful and Remarkable Vegetable Products of the Museum of the Royal Gardens of Kew.* By Sir W. J. HOOKER, K.H., &c., Director. London: Longman, Brown, Green, and Longmans. 1855.

THE POLICY OF THE MEDICAL PROFESSION. Liverpool: Joshua Walmsley, Lord Street. 1855.

THE ESSENTIALS OF MATERIA MEDICA, THERAPEUTICS, AND THE PHARMACOPŒIAS. *For the Use of Students and Practitioners.* By ALFRED BARING GARROD, M.D., &c. London: Walton and Maberly, Upper Gower Street, and Ivy Lane. 1855.

On the Economical Applications of Charcoal to Sanitary Purposes. *A Lecture delivered at the Royal Institution, Albemarle Street.* By John Stenhouse, LL.D., F.R.S., &c. Second Edition. London: Samuel Highley, 32, Fleet Street. 1855.

The Medical Profession in its Relations to Society and the State. An Oration delivered on the Eighty-second Anniversary of the Medical Society of London. By J. F. Clarke, Esq., late Vice-President of the Society, &c. &c. London: John Churchill, New Burlington Street. 1855.

Valedictory Charge to the Graduates of the Philadelphia College of Pharmacy, *delivered March* 22, 1855. By William Procter, Jun. *With a List of the Graduates.* Philadelphia: Kite and Walton, Printers. 1855.

TO CORRESPONDENTS.

The following has been communicated by Mr. Barnes, of Trevor Terrace, Knightsbridge:—

Ferro-Sulphate of Quina.—It was fairly to be inferred, from the analogy subsisting between salts of potassa or ammonia, and compounds of organic bases with chloride of platina, these latter forming double salts, usually very insoluble, that such analogy might perhaps extend to their power of forming alums, as they are termed. I submitted solutions of sulphates of several organic bases (quinine, cinchonine, and brucine) in the proportion of their atomic equivalents, in loosely covered beakers, to spontaneous evaporation. After several months, I observed in the vessel containing sulphate of quinine and sulphate of iron, minute octahedral, perfectly regular, easily recognizable, and colourless crystals, which, on examination, I found to contain quinine and oxide of iron. After rinsing with cold water, they possessed a strongly bitter taste; when heated on platina foil they blackened, indicating an organic substance; and by continuing the heat to ignition, a residue of peroxide of iron was obtained. The quantity formed was not sufficient for analysis. In the other beakers (cinchonine and brucine), the sulphate of organic bases had crystallized apart from the oxide of iron.—H. Will. (*Extracted from the Annals of Chemistry and Practical Pharmacy.*)

Galvinus.—(1.) An increase of coils around the arms of an electro-magnet will increase the power of the magnet, provided the quantity of electricity be not diminished by extending the length of the wire. With a long wire, increased intensity is required in the battery to overcome resistance.—(2.) The short wire and battery force were insufficient to produce intensity of force in the magnet.

M. P. S. (Sunderland).—The presence of lard in butter could not be readily detected, but we believe it is not now used for the purpose of adulterating butter.

W. (Leeds).—*Syrup of Iodide of Iron and Manganese.* Vol. xiii., p. 88.

A Young Chemist (London).—*Artificial Fruit Essences.* Vol. xi., pages 214 and 420.

Inexpertus (Yarmouth).—Hooker's *British Flora* (Longmans).

M. P. S. (Calne).—Blue ink. Vol. xii., p. 70.

R. P. (Regent Street).—More suitable for *Punch* than for this Journal.

Ovum (Newcastle).—We have no recipe for "Jockey Club Perfume," as we have stated before.

J. D. Z.—It is not illegal to sell spirit of wine mixed with any essential oil or otherwise *for medicinal purposes.*

W. G. K.—(Market Drayton).—The quantity of camphor is too large for solution.

E. S. (Manchester).—The crystals (deposited from sweet spirit of nitre) are nitrate of potash. Carbonate of potash had no doubt been used to neutralize the free acid in the spirit.

Apprentice (Aberdeen) and *W. G.* (Carlisle) next month.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd of the month) to Mr. Churchill, 11, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XV.—No. II.—AUGUST 1st, 1855.

THE REGISTER OF PHARMACEUTICAL CHEMISTS, AND THE LIST OF MEMBERS OF THE SOCIETY.

In accordance with the expressed wishes of the Members at the last Anniversary, the Council have decided to publish a List of the Members, Associates, and Apprentices or Students, which will be completed on the first of January, 1856. It is also considered desirable to publish a similar list annually, and the month of July is the most convenient period of the year, for reasons which may be briefly stated.

All annual subscriptions to the Society become due on the first of January, and the Bye-laws require that they shall be paid before the first of May, that being the time fixed for closing the register, which is certified by the retiring Council at the Annual Meeting. No person who has not paid his subscription before the first of May can claim to have his name on that register, which is, in fact, the register for the current year, and which, if printed in June, would be ready for circulation on the first of July.

The annual publication of the list or register will be attended with a double advantage: First, it will tend to promote punctuality in the payment of the subscriptions; secondly, it will bring more prominently before the public the distinction which it is the object of the Pharmacy Act to establish between regularly educated Pharmaceutists, and dealers in drugs who are not so qualified.

It must be borne in mind that the mode in which the Pharmacy Act is intended to operate, and the only way in which it can produce a beneficial influence, consists in the distinction which it will henceforth confer upon those who come under its provisions. As this distinction can now only be obtained by those who produce evidence that they possess a certain amount of qualification for their business, a tangible and substantial inducement is held out to the rising generation to exert themselves in the acquirement of the requisite knowledge, without which they cannot be admitted to the status of Pharmaceutical Chemists. The seventh section of the Act provides the means by which the public may obtain official information as to the qualification or otherwise of any person respecting whom inquiry may be made of the Registrar. By application to the Registrar, and on payment of a shilling, any person may obtain this information. But the annual circulation of a list or register will ensure further publicity, and thus promote, in a greater degree, the object in view.

One circumstance, however, remains to be noticed, which ought to be clearly understood by the Members, as it involves a principle necessary for the maintenance and future prosperity of the Society. The privilege of registration consists in the character and status enjoyed by those who are connected with the Society, and the value of the published list is derived from the information thus furnished respecting the qualification implied in such registration. It may therefore be—and has been—asked, on what principle is registration made contingent upon the payment of a subscription?—and if a person be entitled to be registered in the year 1855, on what grounds can the non-payment of his subscription in 1856 justify the omission of his name from the register of that year?

In answer to these questions we need only refer to the terms of the Charter and the Act, both of which require the payment of such subscriptions or fees as may be fixed by the Bye-laws. The Society is a voluntary association, established to carry out a public object, and conferring the advantage of a certain character and status on those who belong to it. In order to promote the

objects contemplated by the Society, the Charter of Incorporation was granted; and for extending the benefits which had already resulted from the Charter, the Act was passed, confirming previous provisions and granting additional powers and privileges. The voluntary character of the Society was maintained, but the exclusive use of certain titles was conferred upon persons registered under the Act, who are required, as one of the conditions on which they enjoy the privilege, to contribute their share of the pecuniary support which is necessary for the continuance of the Society.

According to the new system introduced by the Act, the fees are paid on admission, and prior to registration as Apprentices, Associates, or Members respectively; and in these cases the future registration is not contingent upon the payment of an annual subscription. But under the old system the payment was annual, and those Members who were elected prior to the passing of the Act, are subject to the conditions upon which they were elected. They may at their option continue to pay the annual subscription, or commute the same by becoming Life Members. In either case they are entitled to enjoy all the privileges of Membership; but unless they perform their part of the contract, they have no claim to be identified with the Society. An attorney or a barrister failing to pay the annual fee for his certificate, is struck off the rolls; and if a Member of the Pharmaceutical Society fail to pay his annual subscription, his name is omitted from the register for the current year. The annual publication of the list will tend to keep the Society together, and when it is generally understood that the register for the current year will finally close on a certain day, the Members will take care not to be excluded. The list now in course of preparation is the one which ought to have been published on the first of July. The obstacle to its publication was stated at the Annual Meeting, and it was thought desirable to delay it until the end of the year on the present occasion, in order to afford an opportunity to those whose subscriptions are in arrear to renew their Membership.

The above remarks apply chiefly to the list of Members, but the principle is also applicable to the register of Pharmaceutical Chemists, in the cases of those Members who were elected under the old system, subject to an annual subscription. It was the intention of the Act, and it has been ruled by the Courts at Westminster, that every Member is *de facto* a Pharmaceutical Chemist, and as such he must be registered. The Members under the old system have no other claim to registration under the Act. Consequently, in the event of any of these parties ceasing to be Members, their claim to be registered also ceases. The Members under the new system are first examined, and upon production of a certificate of qualification, they claim to be registered as Pharmaceutical Chemists. They discharge their pecuniary obligation to the Society in one payment, and are permanently registered, without reference to their election as Members. Whether they continue to be Members or not, they are Pharmaceutical Chemists for life, unless they should become disqualified for registration by joining the medical profession.

A Pharmaceutical Chemist having acquired this title under the new system, and being elected a Member, pays a Life Member's subscription, and is so registered for life, subject to the proviso, that by joining the medical profession he would be excluded altogether from the registers, so long as he should continue in practice; and in the event of his expulsion from the Society for any misconduct he would be excluded from the list of Members, but not from the register of Pharmaceutical Chemists. Hence it is clear that the privilege Membership is more comprehensive than that of mere registration as a Pharmaceutical Chemist. Such registration implies the possession of a certain amount of qualification for carrying on his business. Membership implies further, that the party is a voluntary participator in the responsibilities, and that he is admitted to share the privileges of the Society, in which is vested the power of carrying out the provisions of the Pharmacy Act. This is the principle which

will, in a few years, be permanently acted upon in the Society. The apparent anomaly of depriving persons of their professional status, on the ground of the non-payment of an annual subscription, is a temporary peculiarity which will diminish every year, and terminate altogether when the Members elected under the old system are gathered unto their fathers.

THE PHARMACOPŒIA COMMITTEE.

The preliminary step in the revision of the Pharmacopœia consists in the arrangement of the Materia Medica, which, as we have already observed, is the most heavy and the least interesting portion of the work. Of the list circulated for correction and suggestions upwards of 2000 copies were issued, of which only a small proportion have, up to the present time, been returned. The Committee being desirous of proceeding with their labours, we take this opportunity of requesting those Members who have any suggestions to offer, to return their lists with as little delay as possible.

Communications have taken place between the three Colleges on the subject of the publication of a National Pharmacopœia, the importance of which is unanimously admitted. There are, however, certain practical difficulties in organizing a Joint Committee, which have caused some delay. In the mean time there is much work to be done in collecting and arranging materials for the final decision of the Committee of the Colleges, and it is this duty which comes especially within the province of the Pharmaceutical Committee. The subject is now fairly before the profession and the public; the inconvenience and danger arising from existing incongruities in the three Pharmacopœias can no longer be kept in the background: Mr. Headlam's Medical Bill now before Parliament contains a provision for removing this evil by the aid of a Medical Council, which would supersede the authority of the three Colleges; and whatever may be the fate of that measure, the production of a National Pharmacopœia has become a matter of necessity.

The Pharmaceutical Society is in part responsible for the progress of an undertaking voluntarily commenced; the Committee will therefore resume its sittings without further delay, and revise the list of Materia Medica, taking advantage of any suggestions and corrections which may have been received from Members of the Society, or other parties to whom copies were sent by the Council.

ANALYSIS OF THE MEDICAL BILL,

BROUGHT IN BY MR. HEADLAM, MR. BRADY, AND MR. CRAWFURD.

We confine our remarks almost exclusively to the provisions of the proposed Act which directly or indirectly relate to Pharmacy, and which might affect the Pharmaceutical interest. The first three sections declare the title to be "The Medical Act of 1855," that it is to take effect on the 1st of August, 1855, also to repeal, wholly or in part, certain Acts enumerated in schedule *A*.

"Sec. 4.—The following terms and expressions used in this Act are intended to have the meanings hereby assigned respectively, as far as such meanings are not excluded by the context, or by the nature of the subject-matter, that is to say, the word 'medicine' to include Pharmacy, and the word 'surgery' to include midwifery."

The 5th section defines the constitution of the "Medical Council."

The succeeding fourteen sections relate to the election of Members of Council and officers, the meetings, and other matters of detail. Sections 19 to 31 inclusive, relate to the appointment and duties of the Registrar, the qualification of Candidates, Examinations, Fees, and Accounts.

"Sec. 32.—The Medical Council shall cause to be published, under their direction

and authority, a book containing a list of medicines and compounds, and the manner of preparing them, together with the true weights and measures by which they are to be prepared and mixed, and containing such other matters and things relating thereto as the Medical Council shall think fit, to be called the 'British Pharmacopœia ;' and the Medical Council shall alter, amend, and cause to be republished, such Pharmacopœia, as often as they shall deem it necessary."

Sec. 33 enacts that persons duly registered under the Act shall be able to recover charges for services, medicine, &c.

"Sec. 34.—After the said first day of November, 1855, no person shall be entitled to recover any charge in any court of law for any medical or surgical advice, attendance, or for the performance of any operation, or *for any medicine* prescribed, *administered, or supplied by him*, unless he shall prove upon the trial that he is registered under this Act."

Sec. 35 prohibits unregistered persons from holding appointments in hospitals, dispensaries, &c.

By sec. 36, to practise as a Physician, Surgeon, or Apothecary, without being duly registered, is a misdemeanor in England and Ireland, and in Scotland a crime and offence.

Sec. 37 enacts, that any person not registered under this Act, who shall wilfully and falsely take or use any name, &c., implying that he is so registered, or that he is recognized by law as a Physician, Surgeon, Apothecary, *or Practitioner in Medicine*, shall, upon summary conviction, pay a sum not exceeding £20, nor less than £5, recoverable as stated in the 38th section.

Sec. 39 relates to fraudulent registration. Sec. 40 places the penalties at the disposal of the Medical Council.

Sec. 41 exempts persons duly registered from serving on juries, &c. Sec. 42 refers to persons practising in the Colonies and to Students prior to the passing of the Act.

The schedules contain the forms of the registers and other matters relating to the machinery for carrying the Act into effect.

From the above condensed summary it will be seen that the Act in its present form would deprive Chemists of the power of recovering charges for medicine supplied or administered. This is enacted distinctly in the 34th section.

Further—as the term "Medicine" includes Pharmacy, the 35th, 36th, and 37th clauses would by implication subject to penalties persons practising Pharmacy (unless registered under this Act), besides excluding them from holding any office in an hospital, dispensary, &c. This would interfere with the appointment of dispensers (unless duly registered under the Act) in hospitals, whether civil or military, and in other public institutions.

It cannot be supposed that the Act will be passed in this form, its avowed object and intention being to amend the laws relating to the Medical profession, and not to supersede Pharmacy as a separate profession or business by including it in the term "Medicine."

To remedy the defects above described it will be necessary to introduce a clause exempting Chemists from the operation of the Act. We are in communication with Mr. Headlam on the subject, do not anticipate any difficulty and in obtaining the protection which the interests of our body require.

The 32nd clause, which provides for the publication of a British Pharmacopœia, may be safely left to be dealt with by the Colleges of Physicians. If they have no objection to the proposition, we shall at all events be delivered from the existing nuisance of three contradictory and clashing Pharmacopœias; but if the Colleges object, they have the remedy in their own hands; and should the threatened invasion of their accustomed prerogative have the effect of stimulating them to expedite this desirable result, Mr. Headlam's Bill will have done good service to the profession and the public, whether it become the law of the land or not.—The Bill is deferred until next session.

THE ADULTERATION OF FOOD AND PHYSIC, AND THE POLLUTION OF WATER.

For many years this has been a hackneyed subject in the medical and other scientific journals. Instances of gross fraud in the drug market and in articles of food have been continually exposed. In the year 1841, and up to the present time, the adulteration of drugs has been a frequent subject of discussion at meetings of the Pharmaceutical Society. In the subsequent year (1842), the late Richard Phillips commenced his series of papers, entitled "Illustrations of the Present State of Pharmacy in England," which were published in this Journal. The illustrations were taken from specimens of drugs and chemicals purchased indiscriminately at different shops and chemically examined, with a result not at all gratifying to some of the vendors, whose names, however, were not mentioned. Mr. Phillips gave practical value to his papers by noticing the tests and reagents for detecting impurities, and in some instances the processes by which the best results might be obtained.

In the year 1851 the Editor of the *Lancet* commenced a series of reports, under the name of "The Analytical Sanitary Commission," Dr. Hassall being retained as the operator, and comprising in his inquiries all the ordinary articles of food, drugs, chemicals, beverages, and the water supplied by the Water Companies.

These reports attracted considerable notice, and caused some degree of excitement among the vendors of the adulterated specimens, whose names and addresses were published in full. We were informed that many actions for libel were threatened, but we believe no case was brought into Court. Some improvement resulted from this exposure, and in proportion as the public were made aware of the existing evils, it became the interest of the vendors of articles which had been subjected to investigation to avoid a continuance of the offence, and to take their stand on the purity of their goods.

Extracts of the Reports, when favourable, were used by some persons as advertisements, and in other cases endeavours were made to counteract an opposite impression, by subjecting improved samples to analysis and publishing the result.

Considerable advantage followed the discussions at the meetings of the Pharmaceutical Society, in which some of the most common adulterations of drugs and chemicals were exposed, and the mode of detection pointed out. For example, we may mention Alexandrian Senna, which was at one time regularly mixed with about 30 or 40 per cent. of cynanchum argel; but, upon the complete exposure of the fraud, which was published in the scientific journals, and became notorious throughout the trade, the evil began to diminish as purchasers became aware of its existence. The mixed senna having lost its value as an article of commerce, it was found more remunerative to import it free from such sophistication, which is now a comparatively rare occurrence. Oxide of zinc was, a few years ago, scarcely to be met with in the trade, the carbonate being generally substituted for it. The publicity which has been given to the fact has led to an improvement, and the pure oxide may now be obtained by any persons who desire it.

Many other instances might be mentioned, but the improvement effected by the voluntary exertions of individuals, and by the exposure of isolated cases of fraud, can only be partial in the absence of legislative sanction; and the Parliamentary inquiry now in progress, will, in all probability, lead to the introduction of an Act for promoting the desired result.

It is difficult to rouse the public at large to a sense of the importance of a subject of this nature. There is a tendency to attribute the inconvenience or danger in the cases pointed out, to accident or carelessness on the part of the

persons injured; and even when the facts are fully known and admitted, it is not so obvious in what manner so extensive and complicated an evil may be most effectually rectified.

The pollution of the Thames has been for many years a common topic of conversation, and attempts have been made to excite the public indignation and alarm at the impure condition of the water supplied for domestic use. These proceedings, however, originated chiefly among the projectors of rival water companies, and a variety of questions arose relating to the sources of supply, the probability of obtaining a sufficient quantity from the proposed new sources, the mode of purifying water by subsidence, filtration, &c., and the discussion by degrees degenerated into a controversy between interested parties, each of whom, by endeavouring to prove too much, cast some doubt or discredit on the evidence adduced. Some of the parties employed to analyze Thames water, with a view of proving that the Thames is not a proper source of supply, selected samples under circumstances favourable to their peculiar views, and in several instances it transpired that the water so selected for microscopic examination had been set aside to "improve," by which means more elegant and elaborate drawings were produced than would have resulted from a fair and impartial examination of the water. When these circumstances were made known by opposing interests, a reaction was the natural result, the prejudice against Thames water subsided, and the tide of fashion having turned in that direction, an extravagant expenditure of money was incurred by several companies (on the authority of Parliament) in laying down pipes to convey water from the locality which had been pronounced by the then prevailing authorities to be the best adapted for domestic use. This has caused a notable diminution in the quantity of water flowing down the Thames in its passage through London, while the use of the river as a common sewer has been continued, with the increased flow of waste water in the tributary drains conveying the accumulations formerly retained in cesspools, but now diffused in a more concentrated form in the great sewer—the Thames. Professor Faraday has done good service to the public by directing attention to the present state of the river, in the concise and practical manner in which he has dealt with the subject. He has pointed out the only remedy for the evil, which consists in diverting the drainage to another channel. The authority of his opinion will have weight, and we hope it will expedite the accomplishment of an undertaking, which, in the present state of the metropolis and of the Thames, has become absolutely necessary in a sanitary point of view.

The investigation of the adulteration of food, medicine, &c., by Mr. Scholefield's committee, will have a good effect, and we have published the evidence at some length in another part of this number (page 84). But it must not be supposed that we endorse all the statements made before that Committee, many of which are much exaggerated, and some of them even ridiculous. We allude chiefly to the assertions of Dr. Normandy, of which we have only given a portion as a specimen; and this scarcely gives an adequate idea of the tissue of absurdities, strung together under the erroneous name of "Evidence." Will any one believe the statement of the quantity of alum in a four-pound loaf—viz., from 25 to 500 grains? Did any chemist meet with calomel in the market containing 60 per cent. of chalk? Some of his other assertions are equally fabulous. The recommendation to purify the Thames water, by passing it through charcoal, is worthy of notice; but Dr. Normandy says "the charcoal would never require renewal!" In the next sentence he says—"Two cubic feet of charcoal were sufficient to purify perfectly 500 gallons of ærated water." If the charcoal never requires renewal, two cubic feet would purify any quantity of water. His statements respecting the constituents of tea and coffee were so confused and erroneous, that he deemed it expedient to write a letter to the *Times*, to correct his evidence; which, however, did not place the matter in its

true light. Dr. Normandy says the ordinary Chemists know nothing about Chemistry. We have heard of a fable in which the pot called the kettle black.

Dr. Hassall deserves credit for the industry and perseverance with which he has pursued his experiments on adulterations. His weak point, however, is the endeavour to prove too much, and the habit of indulging in highly-coloured statements *ad captandum vulgus*. A forcible mode of description may be necessary in popular writing, but scientific evidence rises in value in proportion to its simplicity, and strict adherence to that which admits of positive proof. There may be, and we fear there is, foundation for most of Dr. Hassall's statements respecting the nature of the adulterations which more or less prevail; but his report is of that general and sweeping nature which would lead to a belief that these fraudulent practices, if not universal, are so general as to admit of very few exceptions. The impression of any impartial person, on reading Dr. Hassall's evidence, would be, that the only place in which genuine medicines can be obtained is Apothecaries' Hall. He says, "Out of TWENTY-THREE samples of opium NINETEEN were adulterated." "The drugs retailed at Apothecaries' Hall might be taken to be genuine. He had examined FOUR or FIVE samples, and had never met with an adulterated article." So much for opium! Of scammony he says, "Out of thirteen samples imported only one was genuine; and of seventeen samples purchased of Chemists only one was genuine." The remedy proposed by Dr. Hassall for the evil of adulteration is worthy of remark. "First, That there should be a central Board, and that under this Board an Examiner should be appointed to keep close watch on suspected articles, to make purchases, and forward them to the Board." There is an evident omission in this recommendation which we venture to supply—"Dr. Hassall to be appointed to the above office at a salary of £2000 per annum, with a percentage on articles purchased and examined."

Mr. Warington's evidence is less rambling than that of the other two witnesses above named. He gives a favourable report of the drugs at the Hall, but does not go so far as Dr. Hassall, as he admits the possibility of an exception to the general rule, knowing very well that "absolute purity" is a theoretical term.

Mr. Redwood, Dr. Taylor, and some other witnesses, were not examined in time to admit of the publication of reports of their evidence in this number.

The testimony of practical men, experienced in chemical analysis, accustomed to business, and unbiassed by theoretical speculations is much required in the investigation of this subject. Adulterations have been practised from time immemorial, and will prevail more or less as long as human nature continues to regulate the actions of men. The problem to be solved is—What are the most effectual means of checking this propensity, and protecting the public against its prejudicial effects? We think the principal safeguard consists in publicity and facility of detection, with summary punishment when guilt is proved. The extension of knowledge among the consumers, and especially the promulgation of facts relating to prevailing frauds and the mode of detection, will enable the public to protect their own interest, by patronizing respectable tradesmen and avoiding those who sell their commodities "under prime cost." The publication of the names of convicted persons would be an effectual punishment, as it would tend to counteract the puff direct, which often leads the unwary astray. The appointment of inspectors having power to examine imported goods, and to destroy such as were found unfit for use, would probably be attended with a good result. In our next number we shall continue the summary of the evidence, and hope by that time to be able to add the Report of the Select Committee.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL,

Held on Wednesday, July 4, 1855,

MR. J. T. DAVENPORT, PRESIDENT, IN THE CHAIR,

The Secretary reported the confirmation of the Bye-laws by the Secretary of State, as stated in the following correspondence:—

'To the Right Hon. Sir George Grey, Bart., M.P., one of Her Majesty's Principal Secretaries of State.

"The period having expired to which my Lord Palmerston had limited the confirmation of the Bye-laws of the Pharmaceutical Society, referred to him in accordance with the provisions of the 15 and 16 Vic., cap. 56, I am directed by the Council of the Society to submit them to you for further confirmation.

"I am directed also to transmit to you copies of the Judgments pronounced respectively in the Courts of Queen's Bench and of Her Majesty's Exchequer subsequently to their last confirmation.

"I have the honour to remain, your obedient servant,

"17, *Bloomsbury Square, June* 22, 1855." "GEO. W. SMITH, *Secretary.*

"*Whitehall, June* 30, 1855.

"SIR,—I am directed by Secretary Sir Geo. Grey to acknowledge the receipt of your letter of the 22d inst. and its enclosures, and to return to you herewith the Bye-laws of the Pharmaceutical Society, Sir George Grey having certified his confirmation and approval of the same.

"I am, Sir, your obedient servant,

"*The Secretary to the Pharmaceutical Society,* "H. WADDINGTON.
"17, *Bloomsbury Square.*"

Prefixed to a copy of the Bye-laws:—

"I hereby certify my confirmation and approval of the annexed Bye-laws of the Pharmaceutical Society of Great Britain. "G. GREY.

"*Whitehall, June,* 1855."

The following Resolutions were passed by the Council:—

That a List of Members, Associates, and Apprentices of the Society be published in the month of January next; and that a further List be published in the month of July following, and also in the same month in each future year:

That the Members of the Aberdeen branch of the Society be requested to furnish the names of two or more gentlemen whom they may recommend for appointment as Examiners to conduct the classical examination of Apprentices and Students in that locality:

That the Secretary be authorized to effect a free delivery of the Journals in their monthly issue, adopting, as far as desirable, the new postal arrangements introduced for the distribution of printed publications.

LIST OF MEMBERS, ASSOCIATES, AND APPRENTICES *(continued).*

MEMBERS.

MAURITIUS.....Baissac, Pierre Joseph
Noël, Ferdinand
ST. ANDREWS .....Govan, Alexander
TETBURY .....Foster, George Pitt

MAJOR EXAMINATIONS.

Arnold, William Underwood...Thirsk
Brady, Henry Bowman .....Leeds
Howell, Maurice..... ....Bath
Penton, Charles William .....Maidstone
Player, Jacob Hort.....Bedford
Rowson, Henry .....Chester
Smith, Thomas James .....Grantham

MINOR EXAMINATION.

Williams, David Martin.....Truro.

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	TOWNS.
Atherton, John Henry	Mr. Heath	Liverpool
Bently, William James	Mr. Pryer	Axminster
Bond, Charles Radcliffe	Mr. Medcalf	Ware
Carrington, Ebenezer Thomas	Mr. Toone	Warminster
Simpson, Thomas	Mr. Allen	Boston

ORIGINAL AND EXTRACTED ARTICLES.

ON TRAGACANTH AND SOME ALLIED GUMS.

BY M. GUIBOURT.

*Translated from a Letter addressed to Mr. Daniel Hanbury.**

Before replying to the question which you have addressed to me regarding the *Caramania gum*, allow me to revert an instant to the different gums bearing the names of *Tragacanth*, *Pseudo-tragacanth*, *Bassora*, *Sassa*, and *Kutira* or *Kuteera*.

1. *Gum Tragacanth.*—Of this there are two varieties, the one *vermicular*, the other *flaky*; it is the latter only that occurs in commerce at the present day. M. Theodor Martius supposes that the first comes from the Morea, where it is produced by *Astragalus creticus*, and the second from Persia, where it is furnished by *A. verus*. But if this were the true cause of the difference between the two gums, it is not very evident why the vermicular gum should have ceased to be brought into trade.† For my own part, I suppose that one of the causes of difference between the two gums, results from the circumstance that the inhabitants of the countries producing gum tragacanth, instead of leaving the gum to exude naturally and in small quantity from the *Astragalus*, have learnt to procure it in much larger quantity by making incisions in the stem or branches of the shrub. The microscopic characters of the flaky gum (*Hist. des Drog.*, t. iii., p. 417) might lead also to the supposition that it is the result of some process of purification to which the vermicular gum has been subjected. As regards the species of *Astragalus*, which produces genuine tragacanth, I always admit on the authority of Olivier (*Voyage dans l'Empire Ottoman*, t. v., p. 342) that it is *A. verus*.

2. *Gum Sassa.*—This gum is described in my work, t. iii., p. 418, lines 23—33, and p. 420, lines 24—31. It is characterized by occurring in masses of considerable size, by its *rusty* colour, by its property of only swelling up when immersed in water, becoming then *white* and *opaque*, without sensibly dissolving or forming a mucilage. Lastly, when swollen in water, it acquires a *very dark blue* colour upon the addition of tincture of iodine. I have given the name of *Gum Sassa* to this substance, because it appears to me to possess all the characters of the *Gum Sassa* of Bruce, and I am persuaded that if we had an original specimen of the latter, we should find it possessed of the same properties as the gum occurring in commerce. I cannot, however, affirm that the gum of commerce is produced by *Inga Sassa* rather than by one of the numerous species of *Astragalus* growing in the East.

Among the large Gum Sassa (A), one finds a gum (B) in pieces which are

* This letter is in reply to one inquiring whether the *Caramania Gum* of Mr. Maltass (*vide* p. 19—21) is identical with the *Gomme pseudo-adragante* of M. Guibourt's *Histoire des Drogues*. M. Guibourt had not seen Mr. Maltass's notice on Tragacanth at the time of writing this letter.—D. H.

† [Gum Tragacanth is imported into London from Constantinople and Smyrna. No such variety as *Morea Tragacanth* is recognized in English commerce.—D. H.]

smaller, partially curled into an ammonite-form or having a flattened worm-like shape formed by apparent arched rings [*ayant la forme de vers aplatis formés d'anneaux apparents et arqués*]. This gum has either a rusty colour or the yellowish hue of common gum tragacanth. Water and iodine act upon it in the same manner as upon variety A.; in water it is divisible into fragments, but it remains firm, white, and opaque; it is coloured a very deep blue by iodine. In fact it is identical with the first variety A.

3. *Pseudo-tragacanth.*—There occurs in commerce, either mixed with the preceding gums or separate, another gum (C) which has usually the form of *rounded* or *mammiform tears* [*larmes arrondies ou mammelonnées*] of a dirty yellow or rusty colour. This gum swells out much more in water, *becoming mucilaginous* and partially breaking up into little flocculent masses which remain suspended in the water for some time after agitation. The gum when swollen, being broken down in a mortar, forms a mucilage like true gum tragacanth, but the mucilage when diluted with water subsides to the bottom of the vessel upon standing; lastly, the swollen or precipitated gum treated with iodine acquires only a *deep sky-blue* colour. This gum which I have named *Pseudo-tragacanth* [*gomme pseudo-adragante*] closely resembles that described and figured by Labillardière as produced by his *Astragalus gummifer*, but as a section alone of gum-bearing *Astragali* growing in the East comprises not fewer than thirty-nine species, it is impossible to affirm that this variety of gum is not the produce of *several* of these species.

There is met with among the pseudo-tragacanth another and smaller gum of a yellowish colour, closely resembling true tragacanth and constantly mixed with it in trade. This smaller gum which I have described more particularly in my *Histoire des Drogues*, t. iii., p. 419, l. 12—25, and p. 420, l. 10—23, forms but one species with the preceding, and both should be referred to the same species of *Astragalus*.

All the preceding gums bear in French commerce the designation of *Gomme de Bassora;* but this name having also been applied by traders and by chemists to *Gum Kutira*, has thus lost all its value, and is a term which I think should be banished from scientific language.

MM. Mérat and De Lens make mention in their *Dictionnaire Universel de Matière Médicale*, t. iii., p. 403, of a *Gum Sacquis*, which it appears should be referred either to the Gum Sassa, B, or the pseudo-tragacanth, C.

As to the *Caramania Gum*, of which you have sent me a small specimen, I find that it behaves with water and iodine exactly as the pseudo-tragacanth, C. In thus reverting to the characters of all these gums, I have wished to be able to indicate with more precision my opinion respecting that which you have sent me.

4. *Gum Kutira or Kuteera.*—This gum is of a very different nature from all the preceding, as is evident from its properties, as described in the *Histoire des Drogues*, t. iii., p. 421, 2. Upon its origin there have been formed many erroneous conjectures, even since the publication of some exact data. Thus Roxburgh has well said (*Flora Indica*, t. iii., p. 146) that the gum of *Sterculia urens* had been sent to London as a sort of tragacanth, but that it was soon found that it could not replace that substance; but he gave no name to this gum. De Candolle was perhaps the first to say (*Physiologie Végétale*, t. i., p. 171) that Gum Kuteera is produced by *Sterculia urens;* more recently Endlicher (*Enchiridion*, p. 517) includes among gummiferous trees the *Sterculia urens* of India, and a *Sterculia Tragacantha* from Africa, which from its name alone, must surely be the source of a gum similar to the former. This, moreover, accords with the circumstance that one always finds Gum Kuteera mixed in small quantity with Gum Senegal. Lastly, Endlicher in the same work, p. 532, informs us that *Cochlospermum Gossypium* (*Bombax Gossypium*, L.), a tree which has, perhaps, been wrongly separated from *Sterculiaceæ*, produces a gum called *Kuteera*. From all this it results, that several trees either belonging to

Sterculiaceæ, or allied to that order, appear capable of producing one and the same gum, which gum is that known as *Kuteera*, and this fact seems to me beyond all doubt, both because the *Kuteera* of Africa is exactly similar to that of India, and also because I observed at the Great Exhibition in London, in 1851, a considerable number of samples of Gum Kuteera, of which some were attributed to *Sterculia urens*, others to *S. ramosa*, others again to *Cochlospermum gossypium*. All these gums possessed an odour of acetic acid more or less marked, and showed the remains of a coarsely fibrous bark; but it was the gum of *Sterculia urens* and *S. ramosa* that was Kuteera of the finest quality.

PRACTICAL RULES AND RECIPES IN ELECTRO-DEPOSITION.

BY GEORGE GORE, ESQ.

(*Continued from page* 28.)

97. Next to copper, one of the most easy metals to deposit in a coherent state, is antimony; it may be very readily deposited from a solution of hydrochlorate of terchloride of antimony, *i. e.*, the ordinary chloride of antimony (butter of antimony), as prepared for pharmaceutical purposes, by suspending a small piece of antimony as an anode and using a very weak battery of one or at most two pairs; the chloride is an excellent conductor of electricity, it dissolves the anode freely, and yields plenty of bright metal if the battery power is sufficiently weak and the anode small, and its depositing power is not injured by exposure to light or heat, but appears to be gradually exhausted by working, and it is decomposed by zinc, tin, lead, iron, brass, and german silver, each of which coat themselves with antimony by simple immersion.

98. This solution may be made by chemical means, thus: Take one pound of black sulphide of antimony, add to it four pints of hydrochloric acid, gently heat the mixture with constant stirring until the gas evolved decreases, then boil it slowly down to two pints, keeping it partly covered all the time; cool it, filter it through calico, and keep it in a stoppered bottle, its specific gravity is 1.47; it is a yellowish-red fuming liquid, but becomes nearly colourless by depositing metal from it by the battery.

99. A somewhat similar solution may be made by the battery process by passing a current from several pairs of Smee's battery through strong hydrochloric acid by means of a large anode of antimony, until sufficient metal is dissolved. This solution is of a pale yellow colour, probably arising from iron in the metal of the anode. A large amount of impurity containing much sulphur is set free at the anode by this process.

100. The most common salts of antimony are the sulphide, the chloride, and the potasso-tartrate; the latter is not to be compared to the chloride for depositing purposes. I have never been able either with strong or weak batteries to deposit anything better than a small quantity of antimony in the state of a black powder from an aqueous solution of the latter salt.

101. The mixed chlorides of antimony and ammonia form an excellent depositing liquid, it conducts easily, yields its metal freely and of good quality, and does not act so strongly upon the baser metals as the chloride of antimony alone; it may be formed either by the battery process by mixing one measure of a saturated solution of hydrochlorate of ammonia (sal ammoniac) with one measure of hydrochloric acid, aud *working the metal into it* by the battery with a large antimony anode, or by mixing together equal measures of the commercial chloride of antimony and of a saturated solution of hydrochlorate of ammonia.

102. The mixed chlorides of antimony and bismuth, or of antimony and manganese, also form very good depositing liquids, but do not appear to possess any general advantages over the one already described.

103. A very excellent solution may also be made by dissolving five pounds by weight of the potassio-tartrate of antimony in a mixture of four pounds of water

and five or six pounds of hydrochloric acid; it is an excellent conductor of electricity.

104. Both the black and the red sulphides of antimony dissolve in cold hydrosulphate of ammonia, and the resulting solutions conduct very freely with an antimony anode and one pair platinized silver battery, but yield no deposit of metal even with a battery of twenty-five pairs intensity; aqueous solutions either of caustic potash, tartrate of potash, or oxalate of potash, scarcely conduct at all with an anode of antimony and a battery of one or two pairs intensity. Cyanide of antimony dissolved in a solution of cyanide of potassium has been proposed as a depositing liquid, but I have found a solution of cyanide of potassium a very bad conductor with an anode of antimony.

105. The appearance of antimony when deposited from any of the chloride solutions by a weak and continuous current is very brilliant, similar to highly polished steel; it is very brittle and semi-crystalline, and if the process is interrupted it is scaly and deposited in layers; when it is deposited rather rapidly, some of its properties are very peculiar and interesting, especially with regard to heat (see an article upon the subject in the *Philosophical Magazine*, January, 1855): "If during any part of the time the deposit is progressing, the deposited antimony be taken out and struck gently or rubbed with any hard substance, such as metal or glass, an explosion occurs, with a small cloud of white vapour, sometimes with a flash of light, and nearly always with considerable heat, sufficient to burn one's fingers, melt gutta-percha, burn paper, and even scorch deal wood quite brown, especially if the deposit is thick; and invariably accompanied by fracture of the deposited metal; sometimes, if the process of deposition has been interrupted and the deposited metal is not homogenous, only a thin scale falls off, in such cases the heat and explosion are less; in other instances, where the process was regular and the metal homogenous, the fracture extended quite through the metal to upwards of one-eighth of an inch in depth. I have observed this phenomenon in about nine instances, in several of which the explosion took place even in the liquid, by striking the deposit against the glass containing vessel; and in one instance it occurred after the metal had been well washed with dilute hydrochloric acid, dried, and had remained out of the liquid several hours."

106. Since publishing these observations I have met with the same phenomenon many times, and in several instances a deposit has been going on in the chloride solution, and has been removed an instant for examination, and the battery power (one cell of Smee's) has been increased by addition of acid, and upon the next examination, some hours afterwards, the deposit has been found cracked in many directions, as if a feeble explosion had occurred in the interval, the apparatus being meanwhile unmoved. It has been suggested that the deposit is a compound of antimony and hydrogen, and this idea is favoured by the observation, that when the metal is deposited very slowly indeed the explosions do not occur, and that in every case where an explosion took place the metal had been deposited more rapidly—the extra power probably depositing hydrogen also; which, instead of being as usual evolved, might, in its nascent state, combine with the metal and form an explosive compound. I would hazard the additional suggestion, that the metal is deposited in a peculiar structural condition—a state of unequal mechanical tension, similar to that of unannealed glass, and that when broken, the closer aggregation of the particles develops heat and light.

107. Another peculiarity in the deposition of antimony from the chloride is, that if the cathode be sustained, partly in the liquid, and kept uniformly at that depth without disturbance, a deposit of the metal will occur upon it at the surface of the liquid, and spread out gradually in the form of a thin button all around (if it be a wire), and ultimately touch the anode if sufficiently near, lying as a circular sheet of metal upon the surface of the

liquid, whilst the deposit beneath progresses very slowly. I have a button $1\frac{5}{8}$ inches in diameter and $\frac{1}{16}$ of an inch thick formed in this way upon a piece of wire $\frac{3}{16}$ of an inch thick, the part of deposit beneath the surface of the liquid being only $\frac{1}{2}$ an inch in diameter. The battery used was a one-pair Smee's, and the process occupied about eighteen days.

108. Antimony does not spread over black-leaded gutta-percha surfaces, nor does it adhere with any degree of firmness when deposited upon copper, brass, or iron, nor has the deposition of it been yet applied to any useful purpose, although thick and bright deposits of considerable thickness may easily be obtained.

109. Bismuth is a metal which requires a much weaker current even than antimony to deposit in a bright coherent state ; it may easily be deposited from a solution formed by dissolving either nitrate or sub-nitrate of bismuth in a mixture of nitric acid and water; its appearance, when very slowly deposited, is very beautiful; it has a fine silky lustre, white with a faint pinkish tint; it does not spread over black-leaded surfaces: a bismuth anode does not dissolve easily in a solution of cyanide of potassium, even if the liquid is hot.

110. Zinc may be readily deposited either by the single cell or by the battery process, from a neutral solution of sulphate of zinc; the single cell is less adapted for its deposition than the battery, because the acid set free by the deposition process reacts upon the deposit and diminishes its cohesion.

111. The solution may be formed by dissolving from one to two pounds of sulphate of zinc in one gallon of water and filtering the mixture; it requires to be worked with very weak battery power, on account of the tendency to evolve hydrogen gas at the depositing surface. The best solution I have used has been the spent battery liquid taken from a Smee's battery in which there had occurred a good deposit of zinc upon the platinized silver plate.

112. Various other solutions may be used to deposit zinc, such as the chloride, nitrate, acetate, the double chloride of zinc and ammonia, &c.; but it does not appear that they possess any general advantages. Amongst other solutions, cyanide of zinc dissolved in a solution of cyanide of potassium has been recommended; but it is a bad conductor with a zinc anode, and requires to be used hot to make it conduct at all freely, or to make the anode dissolve: this might easily have been foreseen by a knowledge of the fact that the affinity of cyanogen for all, or nearly all the baser metals, is very feeble.

113. I have found by experiment that a solution of cyanide of potassium in water will dissolve only about half as much cyanide of zinc as of cyanide of copper. Cyanide of zinc dissolves freely in an aqueous solution of sesquicarbonate of ammonia. Also zinc-oxide dissolves freely in a boiling aqueous solution of cyanide of potassium. Ferrocyanide of zinc is but feebly soluble in a boiling aqueous solution, either of ferrocyanide (yellow prussiate) or of ferridcyanide (red prussiate) of potassium, but it is freely soluble in a boiling aqueous solution of cyanide of potassium.

114. It is said that copper or brass may be coated with a thin deposit of zinc, by boiling it with a solution of chloride of zinc and hydrochlorate of ammonia, in contact with a quantity of zinc turnings. By the battery process, zinc deposits may be made to spread over black-leaded surfaces.

115. Tin may easily be deposited upon iron or zinc by simple immersion or wash process, according to Roseleur's patent, thus:—Dissolve $17\frac{1}{2}$ ounces of ammoniacal alum in 22 pounds of boiling water, and, when dissolved, add one ounce of protochloride of tin. The articles to be coated are well cleaned, and then immersed in this liquid until they are sufficiently white. The ammoniacal salt lasts a long time, but the tin salt requires occasional renewal.

116. According to the same patentee, tin may also be deposited upon copper, brass, steel, iron, lead, &c., by contact with a second metal in a suitable liquid, thus:—Dissolve $10\frac{1}{2}$ ounces of bitartrate of potash in $17\frac{1}{2}$ pints of water,

then add three-quarters of an ounce of protochloride of tin, and boil it a few minutes. The articles to be coated are immersed in the solution, in contact with a piece of zinc of proportionate size.

117. The same patentee tins copper, iron, zinc, and many other metals, by the battery process, thus:—Dissolve 11 ounces of pyrophosphate of potash or soda in 17½ pounds of water, and then add 4½ ounces of protochloride of tin, and operate by the battery process with an anode of tin. By this process he states that he can tin metals beautifully, and to any thickness. Pyrophosphate of soda is easily formed by heating to redness the common diphosphate of soda. By a similar process, another patentee, Mr. Joseph Steele, coats iron, steel, copper, brass, and zinc, with tin. He proceeds thus:—Dissolve 60 pounds of common soda, 15 pounds of pearlash, 5 pounds of caustic potash, and 2 ounces of cyanide of potassium, in 75 gallons of water at 75° Fah., and filter the resulting solution. Then add 2 ounces of acetate of zinc and 16 pounds of binoxide of tin, and stir the solution until all is dissolved. The solution is then ready. Work it by the battery process with an anode either of zinc or tin, with the liquid at 75° Fah.

118. It is said that tin may also be deposited upon copper or brass by immersing the articles of copper, &c., for a few minutes in a boiling solution of stannate of potash (oxide of tin dissolved in a solution of caustic potash) in contact with a quantity of turnings of tin.

119. The most common salts of tin are the peroxide and the protochloride; in addition to these there are two others used extensively in Manchester and the cotton-printing districts, namely, the bichloride of tin, and the stannate of soda; *i. e.*, oxide of tin combined with caustic soda.

120. The protochloride of tin is easily formed by adding grain tin to strong hydrochloric acid, and keeping it at 150° Fah. until gas ceases to be evolved from the metal; the resulting solution may then be evaporated and crystallized, or it may be diluted with a large quantity of water, and then used for depositing; any cloudiness or white precipitate formed on adding the water may be removed by the addition of a little hydrochloric acid. A similar liquid may be made by the battery process by passing a strong current through dilute hydrochloric acid by means of a large tin anode.

121. A solution either of protochloride or of other chloride of tin is not a good one to obtain reguline white metal from; it has a very powerful tendency to deposit the metal in the form of long crystalline needles of a fern-like appearance, which often project from the corners and edges of the article to a distance of upwards of half an inch; a solution composed of eleven ounces of water, one ounce of hydrochloric acid, and eighty grains of protochloride of tin, admits of this effect being produced in a striking degree; nearly all the compounds of tin, and especially those formed of mineral acids, when acted upon by electrolysis, exhibit this tendency in a greater or less degree, and renders its deposition as fine white metal in thick layers a matter of exceeding difficulty.

122. The stannate of potash is readily formed by precipitating a solution of protochloride of tin by means of ammonia or a solution of caustic potash, washing the precipitate, and dissolving it, while still moist, in a boiling solution of caustic potash; or it may be easily made by the battery process by passing a strong current through a strong boiling solution of caustic potash until the immersed cathode receives a fine white deposit. This solution, if worked at 150° Fah., and properly managed, yields a good deposit of fine white metal, but it decomposes by exposure to the atmosphere, and soon deposits all its metal as oxide of tin at the bottom of the vessel:—a solution of cyanide of potassium and tin has been proposed as a depositing liquid, but it is a bad conductor with a tin anode, even if hot, and does not dissolve the anode freely.

123. Tin is negative to iron at all temperatures between 62° Fah. and 203° Fah. in distilled water, and positive to it at 212° Fah.; it is positive to iron at all tem-

peratures between 62° Fah. and 212° Fah. in a saturated aqueous solution of boracic acid; also the same to iron between those temperatures in a strong solution of phosphoric acid in distilled water; or in one measure of oil of vitriol mixed either with nine or ninety-six measures of distilled water; or in a mixture of one measure of the same acid and 192 measures of distilled water from 73° Fah. to 158° Fah. and negative to iron above that to 212° Fah.; it is positive to iron from 72° Fah. to 212° Fah. in a mixture of equal measures of hydrochloric acid and water; it is negative to iron from 70° Fah. to 77° Fah., and positive above that to 212° Fah. in one measure of hydrochloric acid and nine measures of distilled water; it is negative to iron from 70° Fah. to 212° Fah. in one measure of hydrochloric acid and ninety measures of distilled water, and positive to iron from 68° Fah. to 212° Fah. in one measure of hydrofluoric acid and nine measures of water; it is positive to iron in one measure of nitric acid and nine measures of water from 70° Fah. to 111° Fah., and negative from 111° Fah. to 212° Fah.; and it is positive to iron from 82° Fah. to 212° Fah. in a mixture of one measure of nitric acid and ninety-six measures of water.

124. Iron may be deposited in small quantities from an aqueous solution of ferrate of potash. Proceed thus—Make a very strong solution of caustic potash in water, immerse in it a large iron or steel anode and a copper or platinum cathode, and pass a strong current from fifteen or twenty pairs of platinized silver batteries through the solution until it has acquired a deep amethyst or purple colour, by that time the cathode will have obtained a coating of iron, which will be in the state of a black powder if the power has been too great or the cathode too small, or it will have nearly the appearance of a reguline deposit of zinc if the power has been sufficiently low.

125. Iron is electro-negative to copper in the following liquids: powerfully in a solution of hydro-sulphuret of ammonia; feebly in a saturated aqueous solution of acetate of ammonia: in an aqueous solution of ammoniuret of copper and increased by heating the liquid; in liquid ammonia, or in a saturated aqueous solution of ferrocyanide of potassium, each but for a short time, it then becomes positive; in a saturated aqueous solution of bichromate of potash; in a strong aqueous solution of sulphide of potassium it is increasingly positive up to the boiling point of the liquid; in a saturated aqueous solution of hyposulphite of soda. Iron is negative to brass in a strong aqueous solution of sulphide of potassium increasingly up to the boiling point. An aqueous solution of cyanide of potassium is a very bad conductor with an iron anode, even if it be maintained hot.

(*To be continued.*)

SYRUP OF HYDRIODIC ACID.

BY MR. JAMES MURDOCH.

Hydriodic acid in a liquid form has been introduced into medicine by Dr. Andrew Buchanan, as having the therapeutical powers of iodine without its irritant action. It has also been employed by him in the treatment of choleraic disease, and accordingly becomes a preparation of considerable interest.

The following speedy formula he has given for preparing it:—

Take of Tartaric acid.....264 grains
Iodide of Potassium...330 grains

Dissolve each separately in f ℥jss of distilled water; mix the solutions, agitate and strain to separate the bitartrate of potash, adding water to make up the measure to f ℥vj ¼. Each fluid drachm of this solution should contain 5.072 grains of hydriodic acid, equal to about 5 grains of iodine. When the solutions are mixed the liquid assumes a slight yellow colour, and in ten minutes after gives a slight tinge of violet with a cold solution of starch, which gradually changes to a deep blue.

This rapid decomposition appears to arise in some measure from the agitation necessary to effect the separation of the bitartrate, and consequently greater contact with the air. When hydriodic acid is prepared by the sulphuretted hydrogen process, it does not show decomposition for an hour or two after it is prepared; but if moderately agitated it shows the presence of free iodine much more speedily. It is, therefore, essential in dispensing this acid, to prepare it extemporaneously and supply it frequently to obtain its medicinal action. It may very speedily be prepared by the above process; and for convenience the solutions may be kept ready made and mixed when required; but as 264 grains of tartaric acid in f ℥iss of distilled water measures f ʒxv, and 330 grains of iodide of potassium in the same quantity of water, measures f ʒxiv, it will be necessary to employ them in these relative proportions. Dr. Buchanan also directs it to be taken in starch gruel, which has the chemical effect of combining with the iodine that is liberated during the time of its administration.

I find that hydriodic acid may be prevented from undergoing this decomposition when in the form of a syrup.

The antiseptic properties of sugar are well known to the Pharmaceutist, in the vegetable kingdom in the case of vegetable syrups, and in the mineral kingdom in the case of certain protosalts of iron, where the presence of sugar prevents the latter from becoming peroxidized by the absorption of oxygen, as in the cases of the carbonate, iodide, and protonitrate of iron.*

What method, therefore, will be best adapted for the preparation of this syrup? In the usual way of preparing hydriodic acid, by passing sulphuretted hydrogen through iodine suspended in water, the iodine is very apt to be enveloped in portions of the sulphur that is set free, and escape the action of the H S. This being guarded against, a solution of hydriodic acid could be obtained, from which a syrup might be prepared, if cautiously operated upon, that would contain no free iodine. The repugnance, however, that is usually felt by the Pharmaceutist to the employment of H S, as the means of preparing pharmaceutical products, would render this process objectionable, although it should be found to be in other respects available.

With another means of preparing this acid, by decomposing a solution of iodide of barium by the equivalent of sulphuric acid, and filtering to separate the insoluble sulphate of barytes, as the iodide of barium itself is an unstable compound, it would be necessary to prepare this salt at each manipulation.

Assuming, therefore, that if a syrup can be prepared by Dr. Buchanan's solution that shall contain no free iodine, it will furnish the most suitable manner of obtaining this acid for medicinal purposes, I have to propose the following proportions for a syrup. It is necessary, however, to observe, as one of the conditions of success, that the iodide must be free from any trace of iodate of potash.

Of four different samples of iodide that came under my notice, all gave a slight iodine reaction with solution of tartaric acid and starch. These, although containing extremely little of the other impurities usually found in iodide of potassium, were contaminated with a minute portion of iodate of potash. They had been prepared by what is known as the caustic potash process, and accordingly extremely liable to contain some undecomposed iodate. But as it is quite possible to produce a salt by this process that shall be entirely free from even a trace of iodate, I think it is only necessary to guard manufacturers against this salt occurring in their product, to make it suitable for preparing hydriodic acid. I have accordingly used an iodide prepared by the Pharmacopœia method of decomposing the solution of iodide of iron by carbonate of potash:—

---

* Syrup of protonitrate of iron, *Pharmaceutical Journal*, vol. xi., pages 329 and 330. W. Proctor, Jun., and W. Livermore.

THE SYRUP.

Take of Sugar .....℥ij. ʒss.
Water .....ʒv.

Dissolve in a flask with the aid of heat, and allow it to cool. Prepare solution of hydriodic acid as before mentioned, without adding any of the additional water. This operation should be done speedily, and it may answer for that end to strain it through calico. If paper were used, decomposition would show itself before filtration could be completed, unless the quantity was small. Of this strong solution take f ℥ss and ϑj, and mix with the syrup. The whole should measure f ℥ijss, and each f ʒj contain the equivalent of gr ij of iodine.

Or it may be prepared by dissolving the hydriodate and tartaric acid, each in syrup instead of water, mixing them together and letting it stand for a few hours to allow the bitartrate to settle, and pouring off sufficient for the required quantity of syrup. With this latter mode, which appears the more feasible of the two, a slight decomposition takes place with the syrup in the first instance, probably owing to the quantity of sugar being insufficient to preserve it; but after being mixed with the larger portion of syrup it remains unchanged.

Syrup of hydriodic acid, by the first method, I have had prepared since the 3rd of June, and it remains nearly colourless. I have also syrups having some colour, which have been made for several months, that have the same appearance as when first prepared. In a syrup prepared early in the winter the sugar has crystallized out of the solution, and the liquor on the surface, now weak of sugar, has a bright yellow colour, and gives a strong reaction with starch; but the crystallized portion is not affected by it unless a little nitric acid is also added, when it reacts strongly.

Hydriodic acid being gaseous it will not be possible to procure it in a solid form combined with sugar. When a strong solution is mixed with powdered sugar and moderately heated, it gives off bubbles of hydriodic acid, becoming darker in colour, reacting strongly with starch, and ultimately becoming completely black, with abundance of free iodine.

The precise action of sugar with reference to those compounds that have been named, is still obscure. Klauer* considers that a regular compound is formed in the case of carbonate of iron, but the subject of this notice is an instance where the action of sugar is not confined to salts of iron.

In conclusion, it is very probable that the protective agency of sugar is exercised over many other decomposable substances that have not been examined as to this property; and if it be so, it must become of corresponding importance as a chemical agent in Pharmacy.

Glasgow, July 9th, 1855.

NITRATE OF SILVER AND TANNIC ACID IN PILLS.

Having been applied to as to the propriety of exhibiting these substances together in the form of pills, some experiments were made to determine the chemical change which might occur.

It was believed, *à priori*, that a change would occur, from the well known tendency of tannic acid to run into gallic acid when exposed to the air in a humid state, or when brought into contact with oxygen acids or their compounds. It was thought, however, that in the form of a pill, made as firm as possible, any change which might occur would not proceed very rapidly. Some pills having been prepared, each composed of half a grain of nitrate of silver and three grains of tannic acid, with a suitable excipient, it was observed that they quickly became swollen and subsequently cracked.

---

* Christison's *Dispensatory*, page 425.

An indication was thus given that a change had taken place, which was supposed to have arisen from the absorption, by the tannic acid, of oxygen at the expense of the nitrate, reducing it to oxide, with the formation of gallic acid; the softening, enlargement, and cracking of the pills being referred to the formation of water and the escape of carbonic acid gas, which are always produced when tannic acid is converted into gallic acid.

Solutions of these substances were then separately prepared and mixed. The liquor became brown, and a precipitate was speedily formed. On leaving the mixture during the night, the surface was found covered with a thin pellicle of reduced silver, and deposited was found some oxide of silver. It thus became clear that the tannic acid had not only the power, as was expected, of reducing the nitrate of silver to oxide, but had further reduced a portion of the oxide itself to the metallic state.

One of the pills before mentioned, having become quite hard, was triturated with distilled water, and the liquid filtered. To the filtrate was added a chloride—not the least trace of chloride of silver was observed; to another portion of the filtrate was added sulphuretted hydrogen, without the least change of colour.

It may, we think, therefore, be fairly deduced that such a compound is decidedly incompatible, at least as far as the chemistry of the compound is concerned. The therapeutical view of the matter must be left to the judgment of the medical practitioner, there being many compounds which, although composed of incompatible elements, are not, necessarily, therapeutically incompatible.

W. Copney.

ON THE MANUFACTURE OF CHROMATE AND BICHROMATE OF POTASH, CHROMATE AND BICHROMATE OF SODA, CHROMATE OF LIME, CHROMATE AND DICHROMATE OF LEAD, CHROMATE OF ZINC, CHROMIC ACID, &c. &c.

(*Continued from page* 32.)

Chromate of Potash.—This neutral salt is readily made by adding a sufficient quantity of carbonate of potash to the solution of bichromate to neutralize the excess of chromic acid. The chromate may be obtained in crystals of a canary-yellow colour by evaporation of the solution to crystallizing density.

Chromate of Lead or Chrome Yellow.—This preparation, so extensively employed as a pigment, is met with in commerce of various shades, varying from deep orange to pale canary yellow. It is obtained by adding a filtered solution of neutral chromate of potash, soda, or lime, to a filtered solution of nitrate or acetate of lead, well washing the precipitate and carefully drying it out of the reach of sulphuretted vapours, the presence of which would much diminish its beauty. Dr. Ure states, that a lighter shade of yellow is obtained by mixing some solution of alum or sulphuric acid with the chromate before pouring it into the lead solution; and an orange tint is to be procured by the addition of sub-acetate of lead, in any desired proportion. In order to obtain a neutral chromate, it is the custom of manufacturers, on grounds of economy, when the nitrate of potash is not collected, to add common soda instead of potash, to neutralize the excess of chromic acid in the bichromate of potash. Terra alba and other white earths are added to the chromate of lead to produce pigments at the price desired. The nitrate is the salt of lead usually employed.

French Chrome Yellow.—Messrs. Biot and Dellisse found in analyzing some French chrome yellow, that it had been adulterated with as much as fifty per cent. of artificial sulphate of lead. This addition admits of a considerable reduction in the price of the pigments, the pure article costing 350 francs the two cwt., the impure substance but thirty-five francs for the same weight. The latter, however, is practically the dearest, for it covers a less surface, and the colour is less durable. It is evident that the substance which communicates the colour to chrome yellow is the chromic

acid, which likewise causes its high price, while the cheaper oxide of lead imparts the valuable property of covering well. They, therefore, proposed to ascertain whether the colour of the chrome yellow would remain the same when the proportion of chromic acid necessary to form chromate of lead is diminished. After a number of experiments they ascertained that the proportion of chromic acid may be reduced to nearly one-half, and that twenty-five parts of neutral chromate of potash, instead of fifty-four parts for 100 parts of chrome yellow, produce the same colour. It then became necessary to ascertain whether the difference between twenty-five and fifty-four could not be made up by another substance ; for instance, oxide of lead or a lead salt, so that the chrome yellow would be cheaper and at the same time cover well. They, moreover, endeavoured to obtain a bye-product, which in the ordinary way is lost. That method, as is well known, consists in dissolving a certain quantity of acetate of lead in hot water, and decomposing it with a solution of neutral chromate of potash, by which means the acetate of potash is obtained in too dilute a state to repay the cost of evaporation. The process they adopt is the following:—The acetate of lead is dissolved in hot water, the quantity of sulphuric acid necessary to convert the oxide of lead into sulphate is calculated and added; the clear liquid which remains after the precipitate has subsided, contains the acetic acid, and may be drawn off and preserved for the preparation of sugar of lead. The sulphate of lead is then washed and treated with a hot solution of neutral chromate of potash, twenty-five parts being used for every seventy-five parts of sulphate of lead. The liquid then contains sulphate of potash, which may be made available, and the precipitate consists of chromate and sulphate of lead. The product thus obtained covers as well as pure chrome yellow, and has as good a colour, while it is much cheaper.

Chromates of Zinc, Baryta, Copper, &c.—A very fine zinc yellow may be obtained by pouring neutral chromate of potash into a boiling solution of sulphate of zinc. The precipitate, which is of a brilliant yellow, is washed repeatedly with distilled water, which after some time becomes coloured, whilst the beautiful yellow colour of the chromate of zinc becomes much paler; a circumstance which appears advantageous in the application of it to the general purposes for which this colour is used. By adding to it some recently precipitated Prussian blue, all the different shades of green may be obtained; but the greater number of them are of a dull colour, and the repeated washings weaken the shades, owing probably to the instability of the chromate of zinc. The green colour is quite as variable when a solution of zinc and sulphate of zinc is added to a solution of yellow prussiate of potash and the neutral chromate of this base ; only, it may be observed, that the green precipitate, while it is yet in suspension, becomes of a perfectly rusty yellow colour, a phenomena probably due to the formation of chromate of iron, as the solutions of iron form yellow precipitates with neutral chromates of potash.

A fine green precipitate may be obtained by adding sulphate of copper to a solution of neutral chromate of potash ; but this brilliant colour is destroyed by washing with cold water, which always passes through of a yellow colour, whilst, even from the commencement, the green precipitate becomes gradually of a blue colour. Another kind of green may be prepared by a mixture of chromate of zinc with indigo carmine, a solution of indigo precipitated by carbonate of potash.

Mr. Murdoch has patented the following pigments of chromate of zinc and baryta:—

Marigold Yellow.—Mix in a suitable boiler 120lbs. of bichromate of potash with from 700lbs. to 800lbs. of water, and sixty lbs. of oxide of zinc, or zinc white; continue the boiling for from twenty-four to thirty-six hours. The precipitate obtained is then separated and washed, and the first washings added to the solution from which it was precipitated. When perfectly washed, the precipitate is to be dried, and either reduced to powder or made up into cakes.

Lemon Yellow.—This colour is obtained by adding to the solution which remains from the first process, together with the washings which were added to it, sulphate of zinc, formed by adding 75lbs. of oxide of zinc to 45lbs. of sulphuric acid, sp. gr. 1.85. The mixture is to be boiled as in the first process, and the precipitate separated, washed, and dried.

Medium Yellow.—To the solution remaining from this last process, together with the washings of the precipitate, add sulphate of zinc, formed by adding 15lbs. of

oxide of zinc to 7lbs. of sulphuric acid, sp. gr. 1.85. This is to be boiled as before, and the precipitate washed and dried. This gives a pale yellow, of a tint between the marigold and lemon above described.

Baryta Yellow.—This colour is obtained by adding to a solution containing 100lbs. of chloride of barium, 84lbs. of the double neutral chromate of potash and soda, boiling these together, then separating, washing, and drying the precipitate. These colours possess the advantage of being unaffected by sulphuretted hydrogen.

Clark's patented process (Aug. 12, 1853) for the manufacture of chromate of zinc is as follows :—*Dark Chrome.*—112lbs. of bichromate of potash is placed in a copper over a suitable furnace, and by the application of heat, melted, and brought to the boiling point. 70lbs. of the oxide of zinc are then mixed with 35 gallons of water in a separate vessel, and when thoroughly mixed, poured into the copper containing the bichromate of potash. The whole is now boiled ; the boiling being continued during one hour, stirring and mixing the whole intimately together. The mixing vessel used is a deep wooden tub, in which there are a number of spigot holes at different elevations. The contents of the copper being placed in this tub, and allowed to stand some time, the colouring matter precipitates from the solution. The upper spigot hole is then opened, and the supernatant liquor is allowed to run off; subsequently a lower hole is opened, and a further portion of the liquor allowed to run off, and so on until all the supernatant liquor is drawn off, and a colouring matter of a pasty consistence remains in the bottom of the tub. Clean water is then to be put into the tub, in order to wash the colouring matter, stirring the whole intimately together, in order to remove any trace of the acid that may remain therein. The colouring matter is again allowed to precipitate, and the supernatant liquor allowed to run off as before. This washing is repeated until the whole of the acid is removed. The chromate of zinc is now to be dried, for which it is removed from the tub and divided into small masses, disposed on suitable shelves or trays, perforated ; or of open basket-work, in a drying-room, heated to about 100° Fah., where it is allowed to remain until all the moisture is dispelled, when it is fit for use.

Light Chrome.—When chromes of lighter shades are required, it is necessary to use a greater proportion of oxide of zinc. For the lightest shades of colour there should be used about 130lbs. of oxide of zinc to 112lbs. of bichromate of potash, and for medium shades a suitable proportionate quantity of those materials, proceeding in a precisely similar manner as before. A quantity of water, in proportion to the additional quantity of oxide of zinc, is to be used in manufacturing the lighter shades of chrome.

Citron and Lemon Colours.—For the manufacture of citron or lemon colour pigments, the liquor derived from the manufacture of chromate of zinc and separated from that pigment when precipitated as before described, is employed. This, together with the liquor resulting from washing it, are placed in a suitable copper, and reduced by boiling until the specific gravity is 25° of the ordinary acid hydrometer. For every eight gallons of the liquor so reduced, 40lbs. of oxide of zinc are dissolved in 24lbs. of sulphuric acid. This mixture of oxide of zinc and sulphuric acid is placed in the copper containing the liquor, with which it is intimately mixed by stirring, and the whole boiled together for one hour. The contents of the copper are now removed, and placed in a tub having spigot holes as before described, and in which the pigment or colouring matter is allowed to precipitate, and from which the supernatant liquor is drawn off as before explained. The colouring matter is also washed by adding clean water to it in the precipitating tub, and drawing it off, which is repeated until all trace of the acid is removed. The colouring matter so obtained is now placed in small masses on the shelves or trays of the drying-room, where the moisture is expelled as explained with reference to the chrome.

Dichromate of Lead.—This pigment is obtained by boiling white lead in a solution of bichromate of potash. It is used to adulterate vermilion, and is met with in commerce, under the names of "Vandyke red," and "mock vermilion."

Runge's Chrome Red.—This process consists in the decomposition of chloride of lead by bichromate of potash :—448lbs. of litharge, 60lbs. of chloride of sodium, and 500lbs. of water are intimately mixed. As soon as the mass becomes white and swells up, considerably more water is added to prevent its becoming too hard. After about four days the mass consists of a compound of chloride and hydrated oxide of

lead. Without separating the mother-liquor, which contains undecomposed chloride of sodium and soda, 150lbs. of powdered bichromate of potash are added, and the whole well stirred together and finally washed.

Chrome Colours of the Electric Light and Colour Company.—A manufactory has been established in the neighbourhood of London for the preparation of these and other colours. Subjoined is an account of the *modus operandi* employed for obtaining the chrome colours.

Double Chromate of Lead and Zinc.—To obtain this colour, a voltaic battery is employed, in which zinc is the positive and lead the negative element. The surface of the lead is platinized to enable the hydrogen to escape easily. The battery is arranged precisely in the manner of a Smee's battery, but excited by nitro-sulphuric acid and chromate of potash. The pigments obtained are chrome yellows, of various depths of tint, produced by the amount of chromate of potash added to the battery whilst working. The chrome yellows are double chromates of lead and zinc. Nitro-sulphate of potash is also obtained. A powerful form of lead battery may be obtained by using cast leaden cells of the same form as the iron cells of the Maynooth battery, and of the same dimensions, and arranged with porous diaphragms and zinc plates in a similar manner; chromate of potash being used. The plates of the lead Smee's battery above described, may be contained in cells of any suitable material; gutta-percha cells answer exceedingly well. The plates may be of any size not exceeding sixteen inches square. The strength of the nitro-sulphuric solution may be one part of sulphuric acid to six parts of water, and about two ounces of pure nitric acid to the gallon of sulphuric acid solution.

Chrome Brown.—This pigment is obtained by using an iron-zinc battery, arranged with or without porous diaphragms, and excited with nitrous and sulphuric acids, chromate of potash being added to both the iron and the porous cell containing the zinc plate. The product of this form of battery is a fine brown colour. Nitrate and sulphate of potash are also obtained. The nitrous fumes which are given off are conveyed into a chamber where sulphur is being burnt, and then, by their agency, converting the sulphurous acid into sulphuric acid. They may also be conveyed into a leaden chamber which is lightly filled with wood-shavings, and converted into acetic ether, by admitting to them in the chamber so prepared, the ammonia, from the batteries used in making some other colours. The nitrous fumes may also be conveyed on to the old iron cells or plates in the presence of water, and thus form nitrate of iron, which is also used in some other colour processes.

Scarlet Chrome.—This pigment is obtained by using lead batteries as before described, but in which, in addition to the chromate of potash, a small portion of caustic lime is employed. The object of adding the lime is to deprive the chromate of lead first formed of a portion of its chromic acid, and thereby reduce it to a sub-chromate, an effect which is productive of changing the colour from a bright orange to a bright scarlet. The chromate of lime which is thus produced, and thrown into the natant liquor, is reconverted into chromate of lead by the addition of a portion of the solution of lead salts, which always result from the working of the forms of lead batteries described, over and above what may have been converted into pigments by the addition of chromate of potash. These solutions of lead salts from the batteries are, moreover, all of them economized by the addition of a further portion of chromate of potash, by which they are converted into yellow pigments.

Chrome Green.—This pigment is obtained by using a battery of iron and zinc, adding prussiate of potash to the iron, and chromate of potash to the zinc, the resulting products having access to each other through a diaphragm; the colour thus obtained will be a green of a depth of tint dependent on the quantity of the two normal colours forming the compound.

Dr. Watson, the originator of these processes, states that "the tints of our pigments are more constant than the tints of ordinary colours, from the fact of the electric current causing a gradual and even transformation of the molecular condition upon which the reflexion of a peculiar tint or hue is dependent."

Chromic Acid.—The method used for preparing chromic acid, when large quantities are required, consists in decomposing the chromate of lead, or chromate of potash, by means of sulphuric acid; but Gay Lussac has shown, that chromic acid thus prepared always contains some sulphuric acid, even although there might have been a preponderance of chromate of lead, and when the chromate of potash is used,

of course there is a large quantity of sulphate of potash. These impurities are generally of no consequence in the processes in which chromic acid is applied in the arts, although they render them quite unfit for use in the laboratory.

Mr. C. Watts's plan is to treat chromate of baryta with concentrated nitric acid, of which it is necessary to use a large preponderance. The principle on which this method is based is, that nitrate of baryta, which results from the decomposition of the chromate of baryta by nitric acid, is quite insoluble in concentrated nitric acid. The chromic acid may be separated from the nitrate of baryta by decantation, or filtration, through asbestos. Care must be taken not to let it come into contact with any organic matter or it will be decomposed. The chromic acid is then to be evaporated to dryness, when the nitric acid will be volatilized, leaving pure chromic acid. When the quantity of chromic acid prepared by this plan is considerable, it will be as well, in order to reduce the expense as much as possible, to carry on the evaporation, so that the superabundance of nitric acid which has been used may be condensed and again used for the same purpose. To ascertain whether the chromic acid is free from nitrate of baryta before it is filtered, it will be as well to take a little out and test it with sulphuric acid; previous to doing which it should be diluted with about six times its weight of distilled water, as sulphate of baryta is slightly soluble in concentrated nitric acid; when, if it contains any nitrate of baryta, more nitric acid must be added. The only precautions necessary to ensure the purity of the chromic acid prepared by this plan are the following:—To use a sufficient quantity of nitric acid, and take care that the nitric acid is sufficiently concentrated, and that it is pure, otherwise the impurities which it contains will remain with the chromic acid. The chromate of baryta may be easily prepared, by mixing together solutions of the chloride of barium and any of the soluble chromates. Before it is used for the preparation of pure chromic acid it should be washed several times. Chromate of lead may be used instead of chromate of baryta, but its employment has the objection, that the chromic acid thus obtained always contains a trace of lead.

Dr. Bolley's process for obtaining chromic acid is as follows:—A boiling saturated solution of bichromate of potash is formed, and during ebullition a weighed quantity of sulphuric acid added to it, sufficient to form with the potash a bisulphate. The mixture is allowed to cool, when it solidifies for the greater part to a granular red mass. This is not chromic acid, but sulphate of potash, with adhering chromic acid, which likewise contains some sulphate of potash. The mass is stirred with a rod to cause the granular part to subside, and the liquid portion decanted. The residual mass is agitated with several small quantities of cold water, and what dissolves is poured off. In this way there is at last contained in the dish an orange-coloured sulphate of potash with very little chromic acid. Most of the chromic acid is contained in the united solutions. This process depends on the circumstance, that bisulphate of potash, which is very soluble at a boiling temperature (two parts in one of water), is dissolved with difficulty at the ordinary temperature, and that cold water mostly removes from it sulphuric acid with scarcely any potash, leaving behind neutral sulphate of potash, while the chromic acid is soluble in the cold water. The concentrated solution of the chromic acid containing a little sulphate of potash and sulphuric acid, may now be partially evaporated, and the chromic acid precipitated from it by the addition of sulphuric acid without any perceptible traces of the sulphate of potash being thrown down with it; for this salt is readily soluble in monohydrated sulphuric acid, and still more readily in acid more diluted. The chromic acid is separated from the liquid by draining on a funnel, the neck of which is loosely stopped with fragments of glass, and then dried on porous tiles; by re-solution in water and slow evaporation, it may be obtained perfectly pure in large crystals.

Subjoined is a table showing the quantities of chromate of iron imported into this country, and the sources of supply. The Shetland isles are the principal source whence this mineral is obtained in Great Britain. Specimens were shown at the Exhibition of 1851 by Sir N. Nicholson, of Fretlan.

QUANTITIES OF CHROMATE OF IRON IMPORTED INTO GREAT BRITAIN.

	1843.				1844.				1845.				1846.				1847.			
	Tons.	cwt.	qrs.	lbs.	Tons.	cwt.	qrs.	lbs.	Tons.	cwt.	qrs.	lbs.	Tons.	cwt.	qrs.	lbs.	Tons.	cwt.	qrs.	lbs.
Russia.....	31	17	0	8		—				—				—				—		
Norway	554	4	0	4	306	2	2	17	933	3	2	10	218	2	0	3	862	2	2	24
Holland		—				—				—				—				—		
Hanse Town		—				—				—				—				—		
Turkey		—				—				—				—				—		
U.S. America	807	14	3	13	2059	15	3	14	1749	14	2	10	1070	10	1	13	935	4	2	19
Total.....	1393	15	3	25	2365	18	2	3	2672	18	0	20	1288	12	1	16	1797	7	1	15

	1848.				1849.				1850.				1851.				1852.			
	Tons.	cwt.	qrs.	lbs.	Tons.	cwt.	qrs.	lbs.	Tons.	cwt.	qrs.	lbs.	Tons.	cwt.	qrs.	lbs.	Tons.	cwt.	qrs.	lbs.
Russia.....		—				—			80	0	0	0	180	0	3	0	77	9	3	0
Norway	348	14	1	25	348	8	3	19	532	16	2	14		—			145	0	0	0
Holland		—			0	7	1	2	0	8	0	20		—				—		
Hanse Town	4	7	1	20		—				—				—				—		
Turkey		—				—			0	3	0	0	498	13	1	18	1498	18	3	6
U.S. America	986	19	3	2	954	3	2	25	1000	8	2	26	635	15	3	19	204	3	3	26
Total.....	1340	1	2	19	1338	19	3	18	1613	16	2	4	1314	10	0	9	1925	12	2	4

ON THE MANUFACTURE OF ALUMINIUM.

BY M. H. SAINTE-CLAIRE DEVILLE.

I HAVE the honour of presenting to the Academy the first specimens of aluminium which I have prepared, at the cost of the Emperor, at the Chemical Works at Javel, by a process which I will only briefly describe on the present occasion, reserving for a future communication a more detailed description of it.

The discovery of manufacturing processes for the production of the materials used in preparing aluminium—namely, chloride of aluminium and sodium—appears to me to have been effected, with the exception of those changes which result from the progress of science and the daily use of the apparatus employed.

The chloride of aluminium is obtained by causing chlorine to react upon a mixture of alumina and coal-tar previously calcined. This operation is easily effected in a gas retort. According to my observations, the action of the chlorine is complete upon a layer of the mixture from four to eight inches in thickness, the gas being under these circumstances wholly absorbed. The condensation of the chloride of aluminium is effected in a chamber made of glazed brick-work. As will be seen from the specimen which I lay before the Academy, it is a compact substance, of considerable density, and composed of crystals of a sulphur-yellow colour. This chloride is but slightly ferruginous. It is entirely purified in its treatment for aluminium, as it is made to pass in vapour over points of iron, heated to about 750° Fahr. The perchloride of iron, which is as volatile as the chloride of aluminium, is transformed, in contact with the iron, into the comparatively fixed protochloride. The vapour of chloride of aluminium as it passes out of the apparatus affords colourless and transparent crystals.

The sodium is now manufactured with great facility either in large or small apparatus. I have studied with the greatest care the influence of temperature, of the heating surfaces, and of the rapidity with which the vapour of the sodium passes out of the apparatus; and I am convinced that it is possible, by properly regulating the heating surface and the diameter of the tubes which carry off the sodium, to produce the metal at a comparatively low temperature—probably about the melting point of silver. Even now our cylinders are much less heated than the

vessels employed for the distillation of zinc. I am at present endeavouring to produce the sodium by a continuous process. I have entirely relinquished the distillation of the sodium, which is now obtained pure by the first operation.

With regard to the reaction of the sodium on the chloride of aluminium, it is at present effected in metallic tubes, the form and arrangement of which is not quite satisfactory. In this last operation my results leave something yet to be desired, but I think these difficulties, which can only be overcome by repeated trials, will not be of long continuance.

At a meeting of the Academy of Sciences, held the 18th of June,

M. Dumas, on behalf of M. H. Sainte-Claire Deville, presented to the Academy some large and beautiful masses of chloride of aluminium, of sodium, and of metallic aluminium in bars, manufactured at the works at Javel, during the experiments made at the cost of the Emperor, with the view of finding a process for manufacturing aluminium on the large scale.

The production of chloride of aluminium having been carried to the extent of from five to eight cwt., the process may be considered susceptible of application on a manufacturing scale.

The manufacture of sodium, so completely changed by M. Deville, yields the metal with a regularity and facility quite surprising.

As the chloride of aluminium and the sodium are both pure, the aluminium which they produce is so also.

The materials employed for the production of one kilogramme (2lb 3oz. avoir.) of aluminium—that is to say, ammonia alum, the alumina derived from it, the chlorine, charcoal, carbonate of soda, and chalk—are all very cheap ; and it would not be surprising that their total cost had been reduced to 32 francs, if it was not that at the commencement of these experiments the price of the sodium itself was 1000 francs the kilogramme, which alone would raise the price of the aluminium to 3000 francs.

It will be observed that the experiments at the Javel Works have not only proved the possibility of producing aluminium on a large scale, by a truly manufacturing process, but they have placed within the reach of the scientific man a very important reagent—namely, sodium—at a very low price.

In fact, this metal, which rivals potassium in regard to the energy of its action, presents none of the difficulties which are encountered in the preparation of the latter. The numerous experiments which have been made in this direction prove that the extraction of sodium is as easy as that of zinc ; that it may be exposed to the air in a fused state without inflaming ; that, in fact, it may flow in the liquid state from the apparatus in which it is made. Its preparation is as easy as that of coal gas.

An agent such as sodium, placed at a cheap rate at the disposal of science and the arts, will not be long, we may be sure, before it takes an important position.

It will be observed, also, that the experiments at the Javel Works present a new method for obtaining the metals which may become available to manufacturers. Hitherto, the metals practically used have been those which occur native, or those which have been reduced from their oxides by carbon. The extraction of aluminium on the large scale opens a new method, as it shows that the metals may be extracted from their chlorides. For some metals this method is indispensable—for others it may prove preferable to the old method. Some metals, hitherto unknown to industry, may be included in its number.

I may add that Marseilles appears to me to be the point in France most eligible for having this new branch of industry carried out in the manner it merits.

Immense quantities of hydrochloric acid are daily allowed to run to waste at Marseilles, which might be turned to useful account, in furnishing chloride of aluminium. In no other place is the sulphuric acid required for extracting alumina from clay cheaper than it is there. Carbonate of soda is made there on an immense scale from common salt. Moreover, workmen abound there who are accustomed to such operations.

It is, therefore, at Marseilles that the manufacture of aluminium on the large scale seems naturally destined to be established and to flourish.

In conclusion, M. Dumas directed the attention of the Academy to the remarkable sonorous property of aluminium, in which respect this new metal could only be compared to some of the most sonorous bronzes, such as bell-metal. This property has not previously been found in any metal in an unalloyed state.—*Comptes Rendus.*

CONSTITUTION OF FLAME.

Dr. W. Hilgard* has recently investigated some hitherto neglected particulars of the physical and chemical history of flame, viz., the nature of the gases produced and the changes which they experience during their ascent in the flame.

With regard to the structure of flame, the author adopts the opinion of Berzelius, that there are four distinct parts—

1. The inner cone.
2. The luminous envelope.
3. The blue envelope, and
4. The faintly luminous curtain surrounding the entire flame.

The flame of a small cylindrical wick is best adapted for examination on account of its uniformity. The collection of the gases at different parts of the flame was attended with very great difficulties. When it is attempted to conduct away the gaseous products of the luminous envelope, the mouth of the tube is immediately stopped up with a sooty deposit, and it is impossible to obtain enough gas for analysis.

The collection of gas from the inner cone of the flame presented less serious practical difficulties, and appeared likely to afford more elucidation of the processes going on. The mode adopted by Porret for collecting this gas by a tube inserted into the flame from above or at the side, admits of a doubt whether the gas is not altered by passing through the heated tube. The author therefore preferred collecting the gas from below, and this was effected by means of an apparatus represented in full by fig. 1, and partly in section by fig. 2.

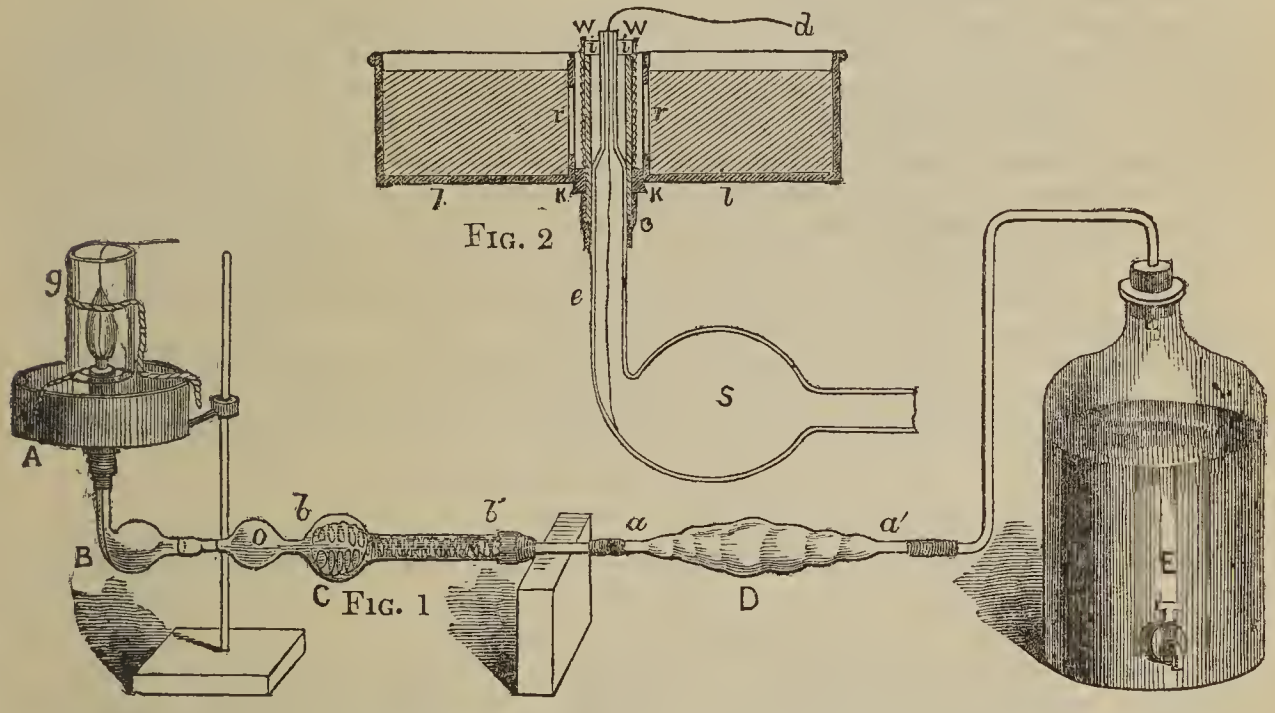


Fig. 2

Fig. 1

l l is a shallow cylindrical tin vessel, six inches in diameter, and one inch and a quarter high, with a hole at the centre of the bottom, where there is soldered a tin tube *r r*, of the same height as the outer vessel. It corresponds to the outer tube of the Argand burner, and is furnished with four longitudinal slits for the supply of combustible contained in *l l*.

i i is a glass tube, quarter of an inch in diameter, fastened by means of a cork *k k* within the tin tube, and forming the inner tube of the burner, upon which the wick is placed. The glass cylinder *g* serves to protect the flame from draughts.

Within the tube *ii* is inserted the beak of the suction tube *B*, the other end of which is connected with a chloride of calcium tube *C*; *D* is a tube for collecting the gas, and *E* an ordinary aspirator. In order to prevent the penetration of atmospheric air between the beak of the suction tube and the inner tube of the burner, a collar of vulcanized caoutchouc, *c*, is placed upon them so as to form a kind of stuffing-box

* *Annalen der Chemie und Pharmacie*, November, 1854.

in which the tube *B* may be slid up or down. The bulb *s* of the suction-tube serves for the reception of the greater part of the substance condensed from the gas ; *d* is a platinum wire, which by conducting heat, serves to prevent the suction tube from being stuffed up by condensed products.

The chloride of calcium tube and the suction-tube were weighed before and after each experiment, in order to ascertain the amount of condensed substance and water. The quantity of water discharged from the aspirator was likewise measured, and thus the quantity of gas ascertained.

The experiment was conducted as follows :—After the solid combustible had been melted in *l l* by a spirit lamp, and heated until it retained a sufficiently liquid state, the wick was lighted, raised as high as possible without smoking, and the suction-tube introduced to the desired height in the flame. The cock of the aspirator was then opened, so that about one liter of gas was drawn through the apparatus in half an hour. At this rate the flame experienced scarcely any sensible derangement in form, although the light was considerably reduced.

The rate at which the gas may be drawn through the apparatus, is determined by circumstances. The slower it is drawn, the more exactly it represents the place at which the orifice of the suction tube is placed, but when too slowly drawn, the wick becomes much incrusted, the flame contracts, the upper edge of the wick becomes ignited and incinerated. On the other hand, when the gas is drawn rapidly, the form of the flame is affected, and the gas obtained does not represent the normal condition of the flame ; moreover, a large quantity of condensible substance is drawn into the aspirator.

In most instances, from 2 to 2.5 liters of gas were collected, so as to ensure the perfect displacement of atmospheric air from the tube *D*, which was then sealed at each end *a á* by the blowpipe flame.

The gas was generally collected at distances of 2^{mm}. It was however evident that this could not be done with any great accuracy. Under the most favourable conditions, the outline of the flame varies constantly from 5 to 10^{mm} in height. Moreover, it is scarcely possible in different operations to obtain exactly the same kind of flame. Even a change of a few degrees in the temperature of the air suffices to affect the flame. The only constant point from which heights can be measured with any degree of accuracy, is the edge of the wick. However, as it was less requisite to determine the composition of the gas at any particular point of the flame than to obtain a general knowledge of its relative composition, the deviation from absolute accuracy in these points is less important.

The analysis of the gas was conducted after the methods described by Bunsen.*

Although several hydrocarbons C^n H^n were undoubtedly present in the gas, they have been designated in common by the term elayl, for the sake of convenience.

A.—GASES OF THE TALLOW FLAME.

Height.	Nitrogen.	Carbonic Acid.	Carbonic Oxide.	Elayl.	Marsh Gas.	Hydrogen.
			I. ALL THE GASES COLLECTED.			
9^{mm}	75.918	14.463	5.649	1.515	1.154	1.301
6^{mm}	72.282	10.896	6.248	6.041	2.682	1.851
4^{mm}	64.404	10.243	6.676	13.104	2.698	2.875
2^{mm}	59.012	10.135	7.222	17.125	3.775	2.731
0^{mm}	63.566	7.132	4.603	18.768	5.204	0.727
-3^{mm}	61.720	11.731	6.269	15.133	3.995	1.152
			II. GASES WITHOUT NITROGEN.			
9^{mm}	...	60.057	23.457	6.292	4.792	5.402
6^{mm}	...	39.310	22.541	21.785	9.676	6.678
4^{mm}	...	28.776	18.755	36.813	8.077	7.579
2^{mm}	...	24.727	17.620	41.780	9.210	6.663
0^{mm}	...	19.575	12.634	51.512	14.284	1.995
-3^{mm}	...	30.645	16.377	39.533	10.436	3.009

* "On the Gases evolved from High Furnaces."—*Report of British Association for the Advancement of Science*, 1845.

B.—GASES OF THE WAX FLAME.

Height.	Nitrogen.	Carbonic Acid.	Carbonic Oxide.	Elayl.	Marsh Gas.	Hydrogen.
			I. ALL THE GASES COLLECTED.			
10mm	76.615	11.695	5.165	3.703	0.851	1.971
8mm	73.962	11.458	5.730	5.157	0.881	2.812
γ. 6mm	71.360	10.797	5.310	8.130	1.340	3.063
β. 6mm	71.089	10.335	5.084	8.914	2.084	2.494
α. 6mm	68.576	10.456	6.116	10.599	1.686	2.567
4mm	64.152	9.990	5.855	14.293	2.931	2.779
2mm	64.086	10.075	5.620	14.885	2.619	2.733
0mm	65.355	9.998	5.421	14.228	2.311	2.687
—3mm	63.612	10.780	5.697	14.292	3.084	2.335
			II. GASES WITHOUT NITROGEN.			
10mm	...	50.014	22.084	15.834	3.638	8.430
8mm	...	44.002	22.006	19.805	3.382	10.805
γ. 6mm	...	37.700	18.541	28.386	4.678	10.695
β. 6mm	...	35.747	17.587	30.833	7.207	8.626
α. 6mm	...	33.274	19.463	33.729	5.365	8.169
4mm	...	27.868	16.332	39.872	8.175	7.753
2mm	...	28.038	15.640	41.428	7.289	7.605
0mm	...	28.858	15.647	41.069	6.671	7.755
—3mm	...	29.625	15.656	39.275	8.478	6.966

TABLE OF CONDENSED SUBSTANCES, FROM ONE LITER OF GAS.

Height.	Wax.	Tallow.
10mm	0.124 grm.	
8mm.	0.151 "	0.115
γ. 6mm	0.169 "	
β. 6mm	0.188 "	0.109
α. 6mm	0.168 "	
4mm	0.316 "	0.130
2mm	0.484 "	0.377
0mm	1.003 "	0.704
3mm	1.567 "	1.493

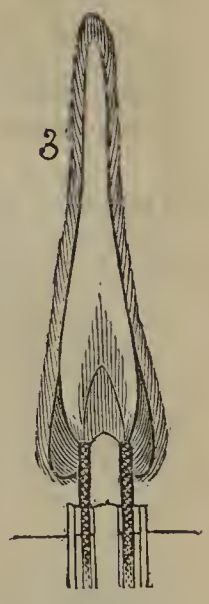
This investigation has shown that the processes taking place in the several parts of the flame are neither so simple nor altogether of the kind they were hitherto supposed to be.

The chemical processes which conjointly contribute to the production of flame, are in the highest degree complicated. Within the flame oxidation and reduction go on, together with dry distillation. The product of distillation mixed with the oxygen continually supplied from the air, experiences a series of changes in temperature, and corresponding chemical changes. This mixture will contain as oxidizing substances, carbonic acid, water vapour, and free oxygen; as reducing substances, carbonic oxide, hydrogen, carburetted hydrogen, and carbon.

By the mutual reaction of these substances, products must be formed in accordance with the law of affinity coefficients. Consequently there is less reason to anticipate such an uniformity in the chemical character of the luminous flame as obtains under the far more simple conditions of gas burning at the mouth of iron furnaces.

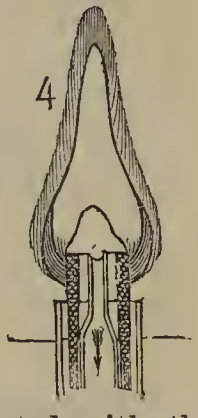
It has been customary to regard a flame as offering some resistance to the outer current of air, and it is always stated that the inner cone consists merely of combustible vapour and gas, the outer portion of which alone comes into contact with air and burns; but the author finds that the amount of nitrogen, even in the lower portions of the flame, is remarkably large, and infers hence that, under the influence of the sucking action of the ascending column of heated gas, air penetrates in all directions. Generally speaking, the influx of air from below is obstructed mechani-

cally by the wick or oil vessel, so that the direction of the current of air at the lower part of the flame becomes nearly horizontal.



This is very distinctly perceptible in the flame of wax in the lamp used for these experiments, as shown by the section fig. 3. The layer of gas rising from the cylindrical wick is as it were blown inwards all round in the direction of the slightly conical line at the base of the inner cone, and from this point the flame resembles that of a solid wick, except that the inconvenience that would arise from an excess of combustible with so large a wick is obviated.

The tables show that there is a point in the inner cone from which upwards the amount of nitrogen increases, then decreases at least in percentage, and again increases steadily to the apex of the flame. This remarkable circumstance may, perhaps, be attributed to the great upward deflection of the current of air in that part of the curtain which by its greater distance from the wick acquires a higher temperature. A second and undoubtedly preponderating cause of this circumstance, consists in the sudden decomposition of condensible substance in the zone between 0 and 2^{mm}, in consequence of the increasing temperature, so that by the formation of a considerable amount of permanent gas the percentage of nitrogen is reduced, notwithstanding the influx of this gas from without. The decided reduction in the amount of condensible substance in this zone is distinctly indicative of such a formation of gas, which becomes further apparent from the distension of the flame at this point.



In the gas collected below the level of the wick the amount of nitrogen is less, and even that may originate from the abstraction of a portion of gas from a higher part of the flame more exposed to the access of atmospheric nitrogen. Probably the gas at this point is quite free from nitrogen.

The section of the wax flame, fig. 4, as it appears when the gas is withdrawn very rapidly, shows the alteration in the form of the inner cone under this influence. The same effect would obtain more or less in the higher parts of the flame, and the gas collected represent a point somewhat above the orifice of the suction tube.

The amount of carbonic acid presents a most intimate relation to that of nitrogen, and this is likewise the case, more or less, with carbonic oxide. This might be anticipated, since nitrogen is associated with the oxygen which contributes to the production of carbonic acid. Nevertheless, the mutual reaction which must take place between the carbonic acid, free carbon and hydrogen, water and carbonic oxide, together with the amount of oxygen in the substance burnt, must produce such differences that the maxima and minima of carbonic acid and nitrogen cannot have definite limits.

There does not appear to be any striking or uniform change in the amounts of marsh gas and hydrogen gas within the region where the formation of gas is greatest. In the case of tallow, while carbonic acid, carbonic oxide and hydrogen decrease, elayl and marsh gas appear to increase. In the case of wax, however, no such relation is presented, and direct experimental results ($\gamma\,\beta\,a$) were too discrepant to justify the search for any constant proportion.

The most obvious relation exists between the carbonic acid and elayl; their amounts appear to be inversely proportionate. This relation is more distinctly perceptible at the lower parts of the flame; higher up, the difficulty of collecting the gas in a normal condition, and without mixture from without, is greater.

Since elayl gas by combustion yields twice its volume of carbonic acid, and twice its volume of water vapour, the amount of carbonic acid would in this case increase twice as much as the elayl decreased, and it would appear that one-half of its carbon is liberated, as in the decomposition by heat. This circumstance likewise indicates that greater part if not all the hydrocarbon $C^n\,H^n$ is elayl $C^4\,H^4$.

The deviations presented by the numerical values from the above-mentioned relations are not so slight as might be supposed at first sight. The total amounts of carbonic acid and of elayl, which should always be the same, vary in the case of wax between 63.8 and 69.4 ; in the case of tallow, between 61.1 and 71.1. But these irregularities are compensated for in a remarkable manner when the carbonic oxide

is taken into account. If this is a product of oxidation from without, it may in fact be regarded as equivalent to carbonic acid, into which it would be converted by combination with more oxygen, and without change of volume. Generally speaking, the carbonic oxide amounts to somewhat more than one-half the carbonic acid, although with such variations, that a constant or regular increased diminution cannot be recognised.

The total amounts of these three substances are as follows :—

	—3mm	0mm	2mm	4mm	6mm	8mm	Mean	10mm
Wax.....	84.556	85.575	85.106	84.072	83.167	85.813	84.381	87.932
								9mm
Tallow	86.554	83.721	84.127	84.344	83.646	—	84.498	89.806

It appears from this table, that to a height of 7 or 8mm this total amount varies within narrow limits, which although too wide for errors of observation, do not invalidate the above inferences, and moreover that at a greater height in a flame, this total amount increases, owing to a preponderance of oxidation products. It is probable that here other processes are determined by the higher temperature, and likewise that the deviation may in part be owing to the disturbance of the flame while the gas is collected. Moreover, it must not be forgotten that as elayl gas is continually being formed, the oxides of carbon could not maintain a constant proportion to it, except by reason of the previously-mentioned source of them, and it is sufficiently remarkable that in these two circumstances there is a mutual compensation.

A very necessary point for the complete insight into the formation of flame would be the knowledge of the amount of water in the gas, but there are insurmountable obstacles to its determination. In the case of substances destitute of oxygen, the amount of water may be easily calculated upon the assumption that the oxygen derived from the atmosphere is altogether consumed in the formation of water and oxides of carbon, and in most instances this would not be very far from the truth. But for substances containing oxygen like tallow and wax, this method is inapplicable, since the decomposition passes through a series of intermediate stages, and substances with varying amounts of oxygen are produced.

The author has, however, attempted to obtain some data for the estimation of the water from the relation between the oxygen in the oxides of carbon and that corresponding to the nitrogen :—

WAX.

	—3mm	0mm	2mm	4mm	6mm	8mm	10mm
Oxygen corresponding to the nitrogen.....	16.869	17.331	16.989	17.012	18.895	19.613	20.317
Oxygen in the oxides of carbon	13.628	12.709	12.885	12.917	12.877	14.223	14.277
Oxygen available for formation of water	3.241	4.622	4.104	4.095	6.018	5.390	6.040

TALLOW.

	—3mm	0mm	2mm	4mm	6mm	9mm
Oxygen corresponding to the nitrogen.....	16.367	16.857	15.649	17.079	19.168	20.132
Oxygen in the oxides of carbon	13.866	9.433	13.746	13.581	14.020	17.288
Oxygen available for formation of water	2.501	7.424	1.903	3.333	5.148	2.844

In the case of tallow, there appear to be very remarkable irregular transitions in the amount of oxygen available for the formation of water, while in the case of wax there is a tolerably regular increase.

With regard to the blue zone at the base of a flame, the author confirms

Plattner's opinion, that it consists of carbonic oxide and a little carburetted hydrogen, formed by the first and weakest action of heat, and is identical with the blue cone of the oxidizing blowpipe flame.

He considers that the luminosity of flame depends upon other conditions than the chemical nature of the burning gas. With regard to the reasons assigned by Davy for the reduction of luminosity of a flame, the author remarks that there is a great difference between the influence of a reduction of temperature and dilution of the gas, which burns with a luminous flame, by another less luminiferous, or quite incombustible. A gas which burns in air, with separation of carbon, will have carbon separated, whatever may be the temperature of the external air. The difference will consist in the degree to which the liberated carbon is heated in the flame. A flame cooled externally becomes smaller and less luminous, in so far as a portion of the carbon escapes unburnt, owing to the comparatively lower temperature. But the other and principal cause of the diminution of luminosity consists in the fact that the elimination of carbon is altogether hindered, and this is the case whenever oxygen has access in sufficient amount for the direct oxidation of both hydrogen and carbon.

These considerations render it unnecessary to assume the existence of a chemical difference between the gas of the inner cone and that burning in the luminous envelope. The reason why the lower part of the flame has only the pale blue light of the blowpipe flame, is, that oxygen has access in large proportion, and undiluted by heat, so that there is no separation of carbon. The reason why the blue envelope extends upwards only to a certain height is obviously that at the point where the flame begins to assume a conical form, the more ascending current of air no longer impinges upon the flame at a right angle, but glides along its surface. Moreover, in the upper part of the flame, the highly heated carbonic oxide burns not with a blue, but a scarcely perceptible yellowish-red flame.

The inner cone is a far more important part of the flame than the blue envelope. In it the distillation products ascending from the wick are converted into gas, and the luminous envelope supplied with combustible. It also contains, mixed with atmospheric nitrogen, oxidation products of the burning envelope, which is traversed by the surrounding air with scarcely any resistance. The mutual relation between the gases produced by dry distillation is altered by those introduced in this manner, and the composition of the gas will vary at different points of the cone.

The results obtained by the author show that the chemical changes in the interior of the cone do not vary in kind, but only in extent.

In the luminous envelope surrounding the inner cone on all sides the chemical changes must be quite different. The outer part of this envelope must contain free oxygen, since the inner side receives oxygen for its combustion only from the exterior air, which must consequently penetrate for some distance through the layer of burning gas.

The combustion of carbon at the expense of water vapour and carbonic acid cannot well be supposed to take place here, because such combustion is not accompanied by evolution of light and heat.

As the free oxygen of air must during the combustion pass some distance before reaching the inner cone in the form of oxide of carbon and water vapour, its quantity must diminish as it approaches this part of the flame, and the brilliance of the flame must suffer a proportionate diminution. It is for this reason that the upper and inner part of the luminous envelope is darker than the remainder, a circumstance which has induced some observers to regard this as a distinct part of the flame.

The form of the luminous envelope may likewise be accounted for in conformity with these conditions. Each successively higher part of the flame receives the combustion products formed lower down, and in consequence of the continuous consumption of distillation products from the inner cone, the flame becomes towards the apex less and less rich in combustible gases. Consequently air may penetrate the upper part of the flame to a greater distance without being wholly deprived of free oxygen, and the thickness of the layer of burning gas will increase towards the apex of the flame. It is for this reason that the luminous envelope appears below as a hollow cone, and above a solid cone.

A reference to the analysis will remove all doubt that the elimination of carbon

by the decomposition of elayl, upon which the brightness of the flame depends, takes place almost exclusively in the luminous envelope. As elayl by separation of carbon would be converted into hydrogen or marsh gas, a diminution of the former gas would be accompanied by a proportionate increase of the two latter. But this relation is not found to obtain, and it may therefore be assumed with great probability that in the combustion of elayl the hydrogen is oxidized before the carbon—as is the case with almost all other hydrogen compounds.

The reducing part of the flame is situated at the point of contact between the inner cone and the luminous envelope, and the reducing influence will decrease towards the outer side of the luminous envelope, in proportion as the amount of oxygen for the combustion of the carbon increases.

These conditions likewise obtain in the blowpipe flame, where there is a gradual transition from the seat of greatest reducing action to that of decided oxidation; and hence difficultly reducible substances must be placed much nearer to the inner cone, in order to effect a perfect abstraction of their oxygen than is necessary for those which are more readily reduced.

The curtain is stated by the author to envelope the entire flame, and not, as some assert, only the lower portion. This may be observed best by placing a little of some soda salt or phosphoric acid on the wick when the curtain appears very clearly defined. At the apex it is somewhat thicker than at the sides, and it is also attenuated at the bases of the flame. With regard to chemical relation of this part of the flame there cannot be any doubt. It consists of ignited atmospheric air mixed with the final products of combustion.

The striking differences of temperature at different parts of the flame have long been observed. In the inner cone the temperature is comparatively very low. It is highest in the curtain, according to the opinion of most, at the apex, and according to Berzelius, at a point about mid-height of the flame. Becquerel first attempted to estimate more accurately the temperature at different parts of the flame by means of a thermoelectric combination. He found the temperature in the spirit-lamp flame is greatest (2462° F.) in the curtain at the upper boundary of the envelope, or rather below the point indicated by Berzelius. In the luminous part of the flame he found the temperature 1976° F., and in the inner cone 1436° F. This latter temperature is undoubtedly given too high, because the wires are heated by the outer part of the flame.

With regard to the light given by equal wax and tallow flames, which according to Peclet are as 13.6 : 7.5, the wax flame being whiter, more slender, and less bulging at a certain part than that of tallow, which burns dingily and smokes readily, the author remarks that this distinction lies not only in the elementary composition, but more especially in the unequal supply and decomposition of the combustible materials, as well as in the access of oxygen from without. The requisite proportion of oxygen is different for each flame; when the access of oxygen is scanty, carbon of course separates from every flame containing that substance, while with an excess of oxygen the flame of the most carbonaceous substances becomes converted into a blue blowpipe-flame. The analysis of the gases distinctly indicates the difference of elementary composition. The great amount of carbonic acid in the lower parts, and its rapid increase in the upper parts of the *tallow flame*, at once call to mind the circumstance, that the original amount of oxygen contained in this combustible material is nearly twice as large as in wax. But nearly the same relation occurs with stearic acid, the flame of which scarcely yields to that of wax in strength. The cause of the difference therefore lies in the amount of oleic acid in the tallow, and in regard to this two things are to be taken into consideration, viz., the excessive supply of melted combustible matter on account of the low melting-point, and its more ready decomposition. The author found that the formation of elayl gas continues much higher in the wax flame than in tallow, and that in the tallow flame the decomposition of the elayl commences at a much lower point in the flame, above which the quantity of elayl diminishes rapidly, and to judge from the large quantity of carburetted hydrogen, more so than with wax, by mere decomposition by heat, and without simultaneous oxidation. The author expresses his inability to assign any reason for the greater weakness in the light of the tallow flame. He points out as a remarkable circumstance that tallow gas containing 19 per cent. of elayl, which according to general opinion should be more valuable as a source of light than the wax gas, containing only 15 per cent., in reality produces, under cir-

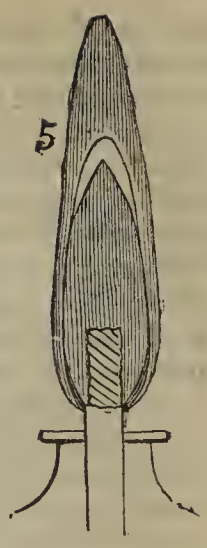
cumstances apparently differing very slightly, a much inferior luminous effect.

With other combustible materials the flame is variously modified. The luminous part is frequently wanting, the curtain more rarely; the blue zone, where the undiluted combustible gas is in contact with fully oxygenated air at a low temperature, is almost always present.

Thus the flame of *carbonic oxide gas* has a distinct dark cone; the envelope is dark blue; the curtain is yellowish-red, and not distinctly separated from the atmosphere.

The flame of *sulphur* has a blue envelope and the curtain is reddish-violet.

In the *alcohol-flame* (fig. 5) the four parts exist. The inner cone is very large, in consequence of the volatility of the combustible material; the luminous sheet, from the very small separation of carbon, forms a very thin conical coat; and the curtain appears very large, in consequence of the slight luminosity of the flame.



ON HYDRAULIC LIME, ARTIFICIAL STONES, AND SOME NEW APPLICATIONS OF THE SOLUBLE ALKALINE SILICATES.

BY M. F. KUHLMANN.

In 1840 I was engaged in the investigation of an efflorescence on the walls of a new building, which was supposed to arise from nitrification, but which was easily proved to consist principally of carbonate of soda. At the same time I found that the lime used for this building was very liable to produce such efflorescences. A more extended investigation proved that all lime-stones, and especially hydraulic limes and natural cements, contain notable quantities of potash and soda.

Theory of Hydraulic Limes.—In a communication, which I had the honour of presenting to the Academy in May, 1841, I endeavoured to explain the parts which potash or soda play in cement stones. I stated that those alkalies serve to bring the silica to the lime, forming silicates which, in contact with water, pass into a state of hydration similar to that of gypsum. Since then I have communicated to the Academy numerous facts in support of this theory, such as the immediate transformation of fat lime into hydraulic lime, by simple contact with a solution of silicate of potash. If, after the burning of the lime-stone, potash be in contact with silica, the silicate which is formed must necessarily react; but this cannot occur until the lime is brought in contact with water.

I have greatly extended my experiments on this point, and I have ascertained that with fat lime and an alkaline silicate, both in fine powder, and mixed in the proportion of 10 or 12 of the silicates and 100 of the lime, a lime can be obtained which presents all the characters of hydraulic lime. If the ingredients were not finely powdered, the reaction would be incomplete, and after the solidification, a disintegration of the mass would take place.

If, from my former results, it appeared possible to convert a mortar made of fat lime into hydraulic cement, by adding to it solution of an alkaline silicate, in my more recent experiments I have discovered a means of immediately producing, with a vitreous silicate and lime, hydraulic cements of any required strength. This affords the means of constructing, at a moderate expense, buildings to resist the action of water, where none but fat limes are found. Powdered silicate of potash becomes, therefore, an agent for imparting the hydraulic property, the value of which must be determined by further experience.

Silicatization: Artificial Stones.—Looking at the great affinity of lime for silica dissolved by means of potash, I was naturally led to examine the action of alkaline silicates on calcareous stones. I was still more fortunate here, for the alkaline silicates immediately became objects for a great number of applications of great utility. We read as follows, on this subject, in the *Compte Rendu* of the meetings of the Academy:—

"By mixing powdered chalk with a solution of silicate of potash, a cement is obtained, which hardens slowly in the air, becoming sufficiently hard to be applicable, under certain circumstances, for the restoration of public monuments, the manufacture of moulded objects, &c.

"Chalk, whether in an artificial paste, or in its natural state, if plunged into a solution of silicate of potash, absorbs, even in the cold, a quantity of silica, which may be increased to a considerable extent by exposing the stone alternately, and for many times, to the action of the solution and of air. The chalk assumes a smooth appearance, a compact grain, and more or less of a yellowish colour, according as it is more or less impregnated with iron. Stones thus prepared are susceptible of receiving a high polish. The hardness, which is at first but superficial, penetrates by degrees into the centre, even when the stones are of considerable thickness. They appear susceptible of undoubted utility in the formation of works of sculpture and various ornaments, even those of the most delicate workmanship; for when the silicatization has been effected on well-dried chalk, which is essential for the production of the best results, the surface remains unaltered. Some attempts made to apply these stones for lithography seem to promise complete success.

"This method of converting soft limestone into siliceous limestone may become of great value in the art of building. Ornaments unaffected by damp and of great hardness may thus be obtained at little cost, and in many cases, a plaster made with a solution of silicate of potash will preserve from subsequent decay ancient monuments formed of soft limestone. This plaster may become of general application in those countries where, as in Champagne, chalk forms almost the only building material."

All these improvements in the art of constructing and ornamenting our buildings so completely described in 1841, have already been largely introduced in practice, and before long our great monuments will find in the process of silicatization the conditions essential to their durability.

There is one important point which I endeavoured to ascertain, namely, how to explain the action of the air in the hardening of artificial or natural siliceous limestones. I have proved experimentally that a portion of the silica of the silicate is separated by the action of the carbonic acid of the air, but that those parts of the silicate which come into contact with a sufficient quantity of carbonate of lime, pass into the state of silicate of lime.

In my paper which I presented to the Academy in 1841, I mentioned the different applications which may be made of the process of injecting mineral substances into porous bodies, whether they be organic or inorganic. Considering these applications of the art to be of the greatest importance in building, I have endeavoured to extend the number of them, and I have laid before the Academy a new series of observations.

I have given the name of *Silicatization* to this remarkable transformation of soft and porous chalks into siliceous and compact limestones. As the application of this process to sculptures and other works gives rise to a colouration sometimes so marked as to render the joints and veins more distinct, I was obliged to remedy this inconvenience.

There are two general results to be provided against. The chalk walls are too white, while some sorts of ferruginous limestones have too sombre a shade. To obviate this evil, I effect the silicatization of limestones which are too white, with a double silicate of potash and manganese. This is a vitreous matter of a dark violet colour, forming a brown solution, which, when employed for silicatization, causes the deposition in the artificial siliceous paste of a little oxide of manganese. Oxide of cobalt will also combine, but in small proportion, with the silicate of potash; and the silica precipitated by a current of carbonic acid is of a fine azure blue. This silicate may be employed in the working of white marbles.

When the colour of the stones is of too dark a colour, which is most frequently the case, I obtain excellent results by adding to the solution of the silicate small quantities of artificial sulphate of baryta, which, by penetrating the porous stone, while it forms a siliceous layer, remains there fixed, entering, as we shall afterwards see, into chemical combination.

With regard to the joints, this may be made with common cements, the colours of which may be rendered lighter by means of some white substance; but this may be still more completely concealed with broken pieces of the stone itself mixed with vitreous silicate of potash, the whole being reduced to a very fine powder before using it, and then applied in the state of a liquid paste.

Colouring the Stone.—In the course of my investigations, with the view of giving to silicified stones such colours as would cause them to harmonize with those not sub-

mitted to the same process, I was led to submit the stones to a true process of dyeing, by impregnating them in the first instance with certain metallic salts, which by precipitation would produce the required colour. Thus, by impregnating the stone with salts of lead or copper, and then exposing them to sulphuretted hydrogen gas or a solution of sulphuret of ammonium, I obtained at pleasure the different shades of grey, black, or brown. With the salts of copper and ferrocyanide of potassium, I obtained a copper colour, &c. On this occasion I observed a fact, which, in a theoretical, as well as practical point of view, is not without interest. I have found that porous limestones, and all other bodies of similar composition, when boiled in a solution of a metallic sulphate, the base of which is insoluble in water, give rise to the disengagement of carbonic acid, and the fixing to a considerable depth of the metallic oxide in intimate combination with sulphate of lime. When the metallic sulphates contain coloured oxides, we thus obtain very beautiful tints of different colours. Thus, with sulphate of iron we get a rusty colour, more or less deep, according to the degree of concentration of the solution. Sulphate of copper gives a beautiful green colour; sulphate of manganese, a brown; and a mixture of sulphates of iron and copper, a chocolate. In the same way I have tried the sulphates of nickel, chrome, cobalt, &c., and mixtures of their sulphates. The affinities which determine these reactions must be very powerful for the metallic oxides of the sulphates to be so completely absorbed by the carbonate of lime, that, with some oxides, such as that of copper, there remains not in the solution, after boiling it with excess of chalk, a trace appreciable by the most delicate tests. It may be remarked, that in operating with mixtures of the salts of copper with those of iron or manganese, the oxides of iron and manganese are precipitated before that of copper.

When we operate with sulphates having colourless bases, such as sulphates of zinc, magnesia, and alumina, we also obtain the precipitation of the oxides, and their penetration to a certain depth into the stone, accompanied by the disengagement of carbonic acid. Biphosphate of lime gives similar results.

In most cases it will be found useful to increase the hardness of the coloured stones by means of silicatization, especially when they are used for buildings or mosaic work. We may proceed in the same way for the production of shells, corals, &c., the colours of which may be produced by the same process, with different degrees of pressure.

I will conclude this subject with an important observation, which is, that the double sulphates which are formed as the solution penetrates into the stone, enter into combination with and increase the hardness of the stone, so that by the use of some sulphates, such as that of zinc, the process of silicatization becomes less necessary.—*Comptes Rendus.*

CONTRIBUTIONS TO THE CHEMICAL HISTORY OF THE ALKALINE SILICATES.

Mr. Struckmann* has studied the relation of alkaline silicates and of silica to solvents with a view to acquire some insight into the decomposition of rocks and formation of soils; likewise to ascertain in what mode silica is transferred into plants, which, like the *gramminiæ*, are rich in this substance. The results which he obtained are in some respects opposed to those of previous experimenters.

The alkaline silicate employed was prepared by melting quartz sand with mixed carbonates of potash and soda. The water solution of the mass contained a large excess of alkaline carbonate.

Carbonic acid was passed for several days through a dilute solution of the silicate. For a long time no turbidity was produced; it then appeared suddenly and increased rapidly until the whole liquid was filled with gelatinous silica. When no further separation appeared to take place the silica was collected upon a filter. The clear filtrate had no alkaline reaction, and was again treated with carbonic acid for eight days continuously, but only a small quantity of silica separated. It was also collected apart by filtration. The filtrate had still a slight alkaline reaction, and the addition of muriatic acid produced violent effervescence, unaccompanied by any separation of silica. Analysis showed that it retained in 100 grms. 0.0300 grm., or about $\frac{1}{32}$ per cent. of silica.

* *Annalen der Chemie und Pharmacie*, June, 1855.

It appears, therefore, in opposition to the statement of G. Bischof, that alkaline silicates are decomposed by carbonic acid, and that after the carbonate which may be present is converted into bicarbonate, the silica is separated in a gelatinous form. The small quantity of silica found in the residual liquid was most probably in solution in a free state.

In Bischof's experiment * the action of carbonic acid was maintained for only twenty-four hours : he states that the solution then contained much carbonate, but no bicarbonate, and inferred that a super-silicate had been formed.

The opinion held by Bischof "that alkaline carbonates and silicates can exist together in solution, it being immaterial whether the water contains only the small quantity of carbonic acid derived from the atmosphere and vegetable mould, or the larger quantity proper to acidulous springs," cannot therefore be maintained. It would be more accordant with observation to infer that the alkaline silicates will be entirely decomposed in water fully saturated with carbonic acid, and that water flowing from felspathic rocks, and containing in solution carbonic acid, will likewise contain carbonates and bicarbonates, together with free silica in solution, while water free from carbonic acid, will contain alkaline silicates, together with carbonates.

Doveri has shown, moreover, that alkaline silicates are completely decomposed by carbonic acid, and Liebig remarks that a solution of soluble glass sets into a jelly when carbonic acid is passed through it.

The solubility of silica was estimated in various liquids by mixing them with pure gelatinous silica, stirring frequently during a long period, and then evaporating to dryness a known quantity of the clear filtered solution. The following results were thus obtained :—

1. Pure water dissolves at the ordinary temperature 0.021, or about $\frac{1}{48}$ per cent. of SiO_3.

2. Water impregnated with carbonic acid dissolves 0.0136, or about $\frac{1}{74}$ per cent. of silica.

Hence the solubility of silica in pure water, and in water impregnated with carbonic acid, is as 3 to 2.

3. Hydrochloric acid (1.088 s. g.) digested for eleven days with hydrated silica at the ordinary temperature, dissolves 0.0172, or about $\frac{1}{59}$ per cent. of silica.

The solubility in pure water and in hydrochloric acid is therefore as 5 to 4.

When the hydrochloric solution is evaporated slowly, hydrated silica, in tufts of acicular crystals, was deposited, a fact already observed by Doveri.

4. Solution of carbonate of ammonia (5 per cent.) in water dissolves 0.02 or $\frac{1}{50}$ per cent. of silica.

5. Solution of carbonate of ammonia (1 per cent.) in water dissolves 0.062, or about $\frac{1}{16}$ per cent. of silica.

In this case, perhaps, silicate of ammonia is formed, but the remarkable difference in the influence of carbonate of ammonia upon the solubility of silica is somewhat difficult to account for.

6. Solution of ammonia, containing 19.2 per cent. NH_3, digested with hydrated silica in a closed vessel, dissolves 0.071, or about $\frac{1}{14}$ per cent.

7. Solution of ammonia, containing 1.6 per cent. NH_3, dissolves under the same conditions 0.0986, or about $\frac{1}{10}$ per cent. of silica.

Fuchs† has obtained for the solubility of silica in water and hydrochloric acid results somewhat different from the above, but this difference may be owing to the circumstance that his silica was prepared in a different manner from fluoride of silicium.

It follows from the above results, that the gradual decomposition of the alkaline silicates in soils, is in great part determined by carbonic acid, and that silica will always be separated in a free state when carbonic acid is present in sufficiently large proportion. But this silica can never be very considerable in quantity, and will for the most part be dissolved, and it is probable that in most cases silica is introduced into plants in a free state. This opinion is, moreover, supported by the large amount of silica compared with alkalies in the ash of cereals and grasses. Thus, in

---

* *Elements of Chemical and Physical Geology* (Works of the Cavendish Society), p. 2.

† *Annalen der Chemie und Pharmacie*, lxxxii., 119.

meadow hay, for instance, Haidlen* found 60.1 per cent. of silica and only 5.5 per cent. of alkaline salts.

The retention of ammonia by silica was proved by the quantitative estimation of ammonia in some air-dried silica obtained by precipitation from silicate of potash and carbonate of ammonia, and washed until the filtrate no longer gave any reaction with chloride of mercury. The quantity of ammonia obtained was equivalent to 3.1 per cent. of neutral silicate of ammonia (NH_4O, SiO_3).

The gelatinous precipitate obtained from solution of alkaline silicate and chloride of ammonium washed until the filtrate gave no reaction with protonitrate of mercury, was found, when air-dried, to retain only half as much ammonia, or 1.46 per cent. of silicate.

THE ADULTERATION OF FOOD AND DRUGS.

At a meeting of the Committee of the House of Commons appointed to consider this subject (Friday, July 13th), Mr. Scholefield in the chair,

Dr. Hassall stated that he had paid great attention to the subject, and was of opinion that adulteration prevailed in nearly all articles, whether food, drink, or drugs. There were few exceptions. The majority of these adulterations consisted of the addition of articles of greatly inferior value, for the purpose of imparting taste, pungency, or smell. He proposed to treat the subject under three heads: first, as regarded the extent of the practice; secondly, the sanitary bearings of the question; and, thirdly, to show the importance of the microscope for discovering the adulterations, and suggesting such remedies as occurred to him. He would proceed to read to the Committee a list, first, of the various substances ascertained by himself to be employed in adulteration; secondly, a list of articles ascertained by others to be so employed; and then a list of other substances supposed to be used, but of which no positive evidence had been obtained. Among the various articles to be enumerated under the first head was anatto, which was adulterated with chalk, wheat flour, rye flour, salt, soap, turmeric, ferruginous earths, Venetian red, and red lead. Arrowroot, both East and West India, with sago, tapioca, and various mixtures and combinations of these. Anchovies, by Dutch, French, and Sicilian fish, coloured by bole-Armenian and Venetian red. Bread, with mashed potatoes, alum, and various other articles. Coffee, with chicory, roasted wheat, rye, and bad flour and bones. Chicory itself with the same substances, with the addition of Venetian red, umber, &c. Curry powder, with ground rice, red lead, &c. Gin, with water, sugar, cayenne, &c. Mustard, with wheat flour, turmeric, &c. Preserves, with salts of copper (chiefly the acetate), ground rice, &c. Vinegar, with water and sulphuric acid. Scammony, with wheat flour, chalk, &c.

The above are a few of the cases mentioned by Dr. Hassall as coming under his own observation, many of the substances being, as he remarked, not only injurious to health, but many of them even poisonous.

The witness proceeded to state, in answer to various questions from the Committee, that there could be no question as to the accuracy of the statements. They had been published from time to time in connexion with the names of the parties, and no one had questioned the statements. The investigations were made regularly for a period of four years, and some twenty to forty samples of the same article were subjected to examination before the report was drawn up. The purchases were made in an impartial manner, and almost every shop in the street was visited, the traders being of all classes, in order to test the extent to which the practice of adulteration extended. The next list of articles of adulteration ascertained by others to be used, was compiled from the examination of different works and papers published on the subject. The following are extracts:—Bread, adulterated with sulphate of copper; flour, with mineral white or hydrate of lime; porter, with cocculus indicus, carbonate of soda, wormwood, ginger, orange powder, sulphate of iron, sulphuric acid, alum, powdered oyster shells, nux vomica, &c. The other list was of articles stated by others to be employed for the purposes of adulteration, but

---

* Liebig, *Agriculturchemie*, 203.

of which no positive evidence had been adduced, though it was probable that many of them had been so employed. Among them were coffee with roasted beans and coffee grounds ; chicory, with ground rice, roasted biscuit, oak bark tan, horses' liver, &c. ; gin, with acetate of lead ; mustard, with powdered linseed, &c. ; tobacco, with cabbage leaf, brown umber, sal ammoniac, nitrate of ammonia, potash, and soda ; vinegar, with pyroligneous, hydrochloric, and other acids.

The witness then proceeded to enter into the details of the various experiments made upon the samples purchased, and said, that in the instance of coffee, of thirty-four samples, in thirty-one chicory was present, roasted corn in twelve. In many instances the quantity of coffee was very small. This was at the commencement of the investigation in the *Lancet*, four years ago. Arrowroot was another article greatly adulterated; in some cases the sample contained scarcely a particle of the genuine article. This was not so much a matter of health, as the articles employed in the adulteration resembled in their nutritious properties the article represented. From an examination of forty-three samples of black and white pepper, more than half were adulterated. Oatmeal was often adulterated with barley-meal, and this had been considered as the cause of the illness among the children at the school at Tooting some time ago. The black teas, congou and souchong, were received into this country in a genuine state, but the rest were adulterated by the Chinese. The green teas from Assam also reached this country pure. The substances employed here in colouring the teas are much more injurious than those employed by the Chinese. As to the adulteration of green tea in this country, many persons are in the habit of examining the leaves that come from the tea-pot to find the whole leaves of some British plants, but he had never met with a single specimen of anything but genuine leaves ; where others were used they were broken up to powder and mixed with gum, and formed into a little mass, and when put into water of course they dissolved. He had never found such substances as sheep's brains, &c., in milk or in cream, although anatto is often used to give colour to it. In pickles, in nineteen cases out of twenty, the vinegar was adulterated with sulphuric acid, and the salts of copper were employed to colour them. This remark applied more particularly to the green pickles, such as gherkins, &c. Out of twenty-one samples of ginger two-thirds were found to be adulterated ; and of twenty-eight samples of cayenne pepper twenty-four were adulterated—bisulphuret of mercury being detected in one sample, and red lead is often present. Cases have been recorded of paralysis having been occasioned by taking snuff, owing to its adulteration with lead, and it is fair to assume its presence in cayenne would produce the same result. No metals escape readily out of the system, and this would be specially the case with red lead and mercury. The object in adulterating cayenne is to preserve its colour.

With regard to preserved fruits and vegetables, out of thirty-three samples twenty-seven were more or less impregnated, with traces of copper, and it was found in some to a considerable amount. The object is, to make the fruits retain their green appearance ; but it is quite unnecessary, and, since this exposure took place, a marked difference has been observed in the shop windows.

Snuff is adulterated with chloride of sodium or common salt, as much as 13 per cent., and various other articles ; and the result of the investigation was, that the snuffs were very much adulterated, and that it was highly prejudicial to health.

In answer to a question by Mr. Peacock, the witness said he had not observed any great difference in the samples procured from wealthy or the poorer neighbourhoods. As to spirits, some contained only one-half as much alcohol as the other specimens, and, therefore, their commercial value was reduced one-half. The adulteration was chiefly water and sugar (this referred to gin), although other substances were found. The same remark applied to rum.

Anatto is a colouring substance, and is used largely in dyeing and colouring cheese and milk, butter and cream ; it is largely imported, and is a very expensive article. From samples of it, chalk was present in twenty-one, wheat flour in four, rye in nine, salt in nineteen, and an oily substance (probably soap) in seven.

In twenty-three samples of opium, no less than nineteen were adulterated, chiefly with wheat flour and poppy capsules, while the active principle of the opium was only present in the proportion of one to five. Opium was one of the most important drugs, especially in cholera cases and *delirium tremens*, and it was essential in such cases it should be good. The drugs retailed at Apothecaries' Hall might be taken

to be genuine. He had examined four or five samples, and had never met with an adulterated article.

Scammony.—Out of thirteen samples imported one only was genuine, and of seventeen samples purchased of chemists one only was genuine.

The witness then proceeded again to read the list of substances employed in adulteration, which included sulphate of copper, verdigris, Brunswick greens, white lead, sulphate of lime, and many others, some thoroughly poisonous.

In answer to a question relative to the water-supply, the witness stated he had a great deal to offer upon that subject, but was not aware whether or not, in consequence of the present state of the supply, the Government had ordered an inquiry. Witness then proceeded to the question of the advantages of employing the microscope in detecting adulterations, observing that without its aid it would in many cases be impossible to discover them. Coffee was very different from chicory in its structure, wheat flour from oats, &c. It was by the aid of the microscope he had detected eleven different substances in a sample sent to him, where the most accomplished chemist would have failed to discover more than one. Until recently, its power was almost unknown, and so recently as 1851, the then Chancellor of the Exchequer had been able to quote in the House of Commons the opinion of three most distinguished Chemists employed to report to the Government, that neither by chemistry nor any other means could chicory in coffee be detected, and until the microscope was employed, no means existed.

The witness then proceeded to state the remedies he proposed and the means to be employed for the suppression of adulteration. First, that there should be a central board, and that under this board an examiner should be appointed to keep close watch on suspected articles, to make purchases, and forward them to the board. Inspectors should be appointed at all export and import towns, as well as large inland towns. Treatises should be published and circulated containing plain directions for their guidance, and, lastly, for the more effectually discovering any adulterations, the public might be invited to forward to the board, under seal, articles suspected of adulteration. Lists of the names and addresses of persons whose goods have been examined should be published, whether found genuine or not. The seller of adulterated articles should be punished by fine, and the adulterators should be punished by fine or imprisonment, or both in aggravated cases. This has long been enforced in France. The Excise does not at present take any notice of adulterations except where they affect the revenue, and all that is necessary is an enlargement of the detective and analytical department of the Excise. All adulteration is injurious to the revenue, but there are no precise *data* to go upon. One witness stated, before a Committee of the House of Commons, that, with regard to one article, beer, the loss to the revenue by the adulteration of malt was £100,000. As to the results to be anticipated from further exposure, the witness said there could be no doubt that adulteration would be diminished by it. He attributed the extent of adulteration to the conduct of the Excise in not exposing cases, and not availing themselves of the means of detection. As to the propriety of legalizing the sale of mixtures, he should be unwilling to legalize it unless a strong case could be made out. It would appear to give a legal sanction to adulteration.

In answer to some further questions by the Committee, the witness said he had not brought these matters under the attention of the Board of Health, nor had he heard them express any opinion. Sir B. Hall, in a letter addressed to the Medical Council, stated it was his intention to deal with the important question of the adulteration of articles of food, drugs, &c.; but hitherto he had done nothing in the matter, his time, probably, having been too much occupied.

The CHAIRMAN said, several members were very anxious to put some questions upon the various matters, and that they must request Dr. Hassall to attend the next meeting of the Committee on Wednesday, at half-past twelve o'clock.

It being four o'clock, the Committee then adjourned.

Adjourned Meeting, Wednesday, July 18th.

Dr. HASSALL produced two samples of pickles, bottled fruits, and vegetables, one in the natural state and the other artificially coloured with salts of copper. He also produced two bottles of anchovy sauce, one of the natural colour, nearly approaching white, and the other of a deep brick colour, owing to the presence of bole armenian in the proportion of 10lbs. of the earth to 100 gallons. He further exhibited some

specimens of coloured sugar confectionery, the colours being chromate of lead, red lead, arsenite of copper, Brunswick green, gambouge, and cochineal, the presence of which could be detected independently of any analysis. Witness referred to a commission issued by Sir George Grey, in 1851, to inquire into the water-supply of the metropolis. Three Chemists were selected to report to the commission, and those gentlemen not being microscopists, reported that they did not discover traces of organic matter in the water. He (witness), however, had examined the Thames water at all seasons of the year, and he had in all instances found organic matter present. He stated this as an additional proof of the value of the microscope in such investigations. In answer to a question put to him at the last meeting by Mr. Villiers, as to whether any commission had been issued to inquire into the state of the water-supply, he (Dr. Hassall) found no commission had been issued, but that it was most probable one would be issued before long. As to the Nuisances Removal Act, he thought it did not contain any provision which might be made available for the suppression of adulteration. There was no immediate remedy for the present state of the water-supply of London, except by stopping it altogether for a time. The water is improved by filtration, but not cured. Witness did not think the present inspectors of nuisances would be able to discharge the duties of inspectors of adulteration at the same time; they might be made available in some way. He believed that a periodical publication of the names of tradesmen selling adulterated articles, would have the effect of checking the practice. The proposed inspector need not be a scientific man, although it might be desirable he should be so. It should be his duty to send suspected articles to the Board, and he (Dr. Hassall) would hold both the seller and manufacturer of the adulterated article responsible. The poor man is absolutely dependent upon the seller of the article, as he cannot change his tradesmen as a richer one might. In the case of adulterated opium, it would be necessary to send the article back to the importer. The largest quantity and the best comes from Turkey.

In answer to several questions as to whether the genuine articles would not be dearer than the adulterated, Dr. Hassall said he thought there would not be much difference. In the United States there is an inspector of imported articles, and if they are found to be adulterated, they are rejected. In France there are somewhat similar regulations in force, the authority being in the hands of the Government. When an inspector discovers an adulteration, it should be his duty to carry on the prosecution so as not to be an expense to any private person. Was aware there were objections to any Central Board, but thought, in this case, it was essential to have some head.

Mr. R. Warington said, he was connected with Apothecaries' Hall as chemical dispenser and resident director. Has adulterations brought to him to examine. With regard to tea, two samples were brought to him in 1844 by an Excise officer, for the purpose of ascertaining if they were genuine. Examined them with the microscope, and found the whole of the tea was faced with a colouring matter, composed of turmeric and a white material like soap stone, and sulphate of lime or gypsum. Made many inquiries to ascertain whether it was done in this country or elsewhere. One large tea merchant asked him if he had seen "unglazed tea," and, upon inquiring what this term meant, was told there were two kinds of tea—one glazed, and the other unglazed. Witness produced specimens of tea from Assam, all unglazed teas. The glaze is often put upon bad and damaged teas. Another specimen produced was a tea imported under the East India Company's old charter; it has a slight glaze, which was done by the Chinese at Canton to equalise the tint; it is simply Prussian blue. Sulphate of lime, being an absorbent, is added to make the tea stand the sea voyage better. In America, teas are much more highly glazed than here. Prussian blue is not injurious, being an insoluble substance, although some of the highly-glazed teas might cause injury to some constitutions. The specimen of "lie tea" produced is made in China. The term is a Chinese one, and denotes a "false" tea. There was an immense quantity imported, and it was endeavoured to pass it as a manufactured article, and not tea, but the Customs do not permit it. Wholesale houses know perfectly well what "lie tea" is. It contains fifty per cent. of inorganic earthy matters; that is, if 100 grains were calcined, fifty grains would be obtained unburnt, and the residue consists of colouring matters and the sweepings of the floor. Is not aware whether the officers of the

Customs could detect the "lie tea" from the others. There is no question but that purer teas were imported before the trade was thrown open, and this was owing to the East India Company's inspectors at Canton. The "lie tea" is comparatively a modern invention, since the demand by the merchants for a cheap tea, as the Chinese will manufacture any article asked for, according to the price paid. "Lie tea" is easily detected by pouring boiling water on it, when it dissolves, leaving the earthy matters at the bottom of the vessel. The "glazed" teas are never drunk in China, being made only for exportation. A Chinese plant is also sometimes sold as tea, which costs not more than 1¼*d.* to 2*d.* per pound. Some of the teas are mixed with the "lie tea" before leaving China, and these will be found to contain eleven to twenty-two per cent. of earthy matters, while "lie tea" itself contains, as before stated, forty-five or fifty per cent. Respectable houses would not use such an article. The greatest adulteration takes place before the tea arrives here, although there was one case in particular at Manchester where tea-leaves and other leaves were collected, and by "glazing" and other means made to resemble new teas.

With regard to the adulteration of drugs, it does not often come under the notice of Apothecaries' Hall. They buy in the market the best that can be procured, and although there may be adulteration to a certain extent—which is the case with almost every article—yet the public may be certain of obtaining the purest the market offers. As to opium, none is imported pure. The juices obtained from the poppy will never dry beyond a certain consistence; some leaves of other plants are therefore added to bring it into a cohesive state—this is adulteration in one sense. Everything bought at the "Hall" is tested.

In answer to a question as to whether the variation in the quality of opium might not seriously affect the prescriptions in which it was an ingredient, the witness said he thought there could be no danger of this, as the average quality was well known. He further stated that all samples of drugs were examined by a committee. Were obliged to grind their own drugs, in consequence of the drug grinders adulterating them during the operation. Was not aware of the composition of the substance called "powder of Post." The College of Physicians have power to examine and inspect all chemists and druggists' shops, and this power is exercised once a year; but the examination is very cursory, and not sufficiently accurate to be of any benefit. There is an agreement between the Admiralty and the Apothecaries' Society, by which they may examine their establishment at any time, but this power has not been exercised. The Hall supplies the whole of the navy, and half the army, and the East India Company. Believes Messrs. Savory have the other half.

With regard to Turkey rhubarb, knew that one manufactory at Banbury produced twenty tons per annum. It is very inferior to Turkey, fetching about 4*d.* per lb., while Russian rhubarb is worth 11*s.* 6*d.* Russian rhubarb comes from the Tartar districts, and is monopolized by the Russian Government. It is brought to St. Petersburg by the caravans, and thence exported. It is a great delusion to believe that rhubarb comes from Turkey. The China rhubarb, commonly called the Turkey, is worth about 7*s.* 6*d.* per lb. At the present time the price is very high indeed. Many chemists profess to obtain their drugs from Apothecaries' Hall, but it is not the fact. The Hall does not supply more than seven or eight.

Cod-liver oil is another drug in which there is an immense adulteration. The oil to be obtained at the Hall is from Newfoundland. In the case of the oil being coloured, it is owing to the liver of the fish being allowed to putrify. This case of adulteration is most difficult to detect, even to an experienced person. There are certain tests published, but the presence of even 5 per cent. only of the pure oil will yield the required result.

Several specimens of mustard have passed through witness's hands, all greatly adulterated, containing from 27 to 30 per cent. of inorganic matter, such as sulphate of lime. The genuine should give only 4½ to 6½ per cent.

Isinglass is very much adulterated with the ordinary gelatine.

Chloroform is not so much adulterated, if care is taken in purchasing. There is always this danger attending its use, that if kept long it undergoes decomposition, the elements reacting on each other.

Quinine is another drug much adulterated.

Dr. Normandy, a physician, and the author of a work on analysis, stated, the articles which had come under his observation were very numerous, and were the

result of ten years' investigation. He would first mention bread and flour, in which the adulteration consisted in the addition of alum, which seemed to be the almost exclusive substance used for the purpose. He had found it so ill mixed with the bread as to present itself in the shape of crystals of the size of a pea. It has the curious property of imparting to bread of second or third-rate quality a whiteness which could only be obtained by the use of the best flour, and another property of much more importance to the baker was, that it enabled him to force into the bread a large quantity of water, thus adding to the weight. The amount of alum in the four pound loaf was sometimes 500 grains, and 250 grains and less in the one pound loaf.

In reply to a question as to whether a chemist would be able to ascertain the fact of adulteration being practised,

Dr. Normandy said, he thought ordinary chemists knew nothing about chemistry; they were simply sellers of drugs. From his own observation, he knew tea to be adulterated with magnesia and the silicate of magnesia. Even the chests of tea are sometimes opened and their contents taken out, and after being mixed are returned and resealed, so that a person buying a chest of tea cannot be certain of having an original article. Believes there is no mode of detecting the adulteration of tea without analyzing it. Knows such adulterations are practised by the wholesale tea merchants in London.

The Committee adjourned at four o'clock.

Adjourned Meeting, Friday, July 20th.

Dr. Normandy, before proceeding with his evidence, wished to correct misapprehension with reference to the quantity of alum in bread. The amount mentioned by him of 500 to 250 grains being found in the quartern loaf was quite a *maximum;* twenty-five grains would be an ordinary quantity, varying from that to the larger amounts. In continuation of his evidence as to bread, Dr. Normandy observed, that in the article called "unfermented bread," carbonic acid and muriatic acid were used as substitutes for yeast. There is danger in the use of these substances, from the fact of muriatic acid containing arsenic generally, and he deprecated the use of any chemical agents in articles of food. The unfermented bread is perfectly indigestible, notwithstanding what has been said by some medical professors who are not conversant with chemistry. With regard to cocoa, it is more adulterated than almost any other substance when it is manufactured into chocolate. It is often mixed with brickdust to the amount of 10 per cent., ochre 12 per cent., and peroxide of iron 22 per cent., animal fats of the worst description, and rancid tallow. Cocoa-nibs are not adulterated, of course, except that sometimes musty ones are mixed up with them. This is, of course, a fraud. Witness had examined upwards of 150 samples with the microscope, and also by chemical tests, and had detected the presence of the above substances, and has sometimes found ground shells. All these adulterations must be made by the manufacturer; they cannot be done by the seller. First examined samples ten years ago, and the consumption has increased immensely since then. The only security for the public at present is in the use of the cocoa-nibs. Coffee is much adulterated with (not to mention chicory) roasted grain, to the extent of 25 to 30 per cent. With regard to "milk," he said it amounted to little more than water in most instances. He was lately in the neighbourhood of Clerkenwell, for the purpose of examining a well in that locality, when he met with a spectacle which prevented him from tasting milk for six months afterwards. He (Dr. Normandy) saw from thirty to forty cows in a most disgusting condition, full of ulcers, their teats diseased, and their legs full of tumours and abscesses—in fact, quite horrible to look at; and a fellow was milking them in the midst of all this abomination; and this was by no means an exceptional case, a great many dairies being in the same condition. The milk in consequence is really diseased milk. This was two years ago. The state of the poor animals must have been produced by the manner in which they were kept. Has analyzed milk, but has never found anything but water—it will bear an enormous quantity without being materially altered in appearance. Three parts of water might be introduced, but it would still look like milk.

Dr. Normandy then proceeded to the adulteration of drugs and confectionery, and said he quite agreed with Dr. Hassall's evidence on these points, and it would be

corroborated by Dr. Taylor. With regard to water, he said the present water supplied by the various companies was nothing better than diluted mud, containing the excrements of two and a-half millions of people, the washing from their foul linen, the hospital abominations, and other filth, and he was astonished that London was not worse off in point of health than was actually the case. He believed, that if the water companies were bound to pass their water through large filters, containing charcoal, it would be rendered perfectly sweet, and the charcoal would never require renewal. His own experience in his own apparatus for distilling sea-water had shown that two cubic feet of charcoal were sufficient to purify perfectly 500 gallons of aerated water.

Dr. Normandy then read a list of adulterations practised in medicines, &c., among which he enumerated cream of tartar, by chalk and sulphate of potash ; calomel, by chalk, to the extent sometimes of 60 per cent.; carbonate of soda, by the sulphate; iodine, by water and black lead, to the extent of 25 per cent.; linseed-meal, with bran and sawdust ; litharge, with various earthy matters ; nitrate of silver, by nitrate of potass ; mercury, by lead, tin, and bismuth.

The Committee adjourned.

Adjourned Meeting, Wednesday, July 25th.

Mr. Simon, the Officer of Health for the city of London, said, he had considered the question of the adulteration of the various articles under consideration merely as a matter of legislation. He was aware, from his own knowledge, that adulterations did exist to a great extent, and that they were most prejudicial to health. The remedies to be employed, it appeared to him, were, that the parties defrauded should have redress by a simple proceeding before a magistrate, and beyond this that there should be a power in the hands of some local authority, because, generally speaking, the individual who suffered injury did so from time to time, and in such small proportions, that he himself was scarcely fit to judge of the amount of injury he sustained, or to make the necessary analysis.

Local boards of health existed in but few parts of the country, but the local board charged with administering the Nuisances Removal Act would be a very proper body to carry out the inquiry. They should, in certain cases, have power to proceed against the vendors of adulterated goods, and whether or not a penalty were recovered, at least they should have the power to publish the names and addresses of offenders, and this publicity would be a very important element in the cure. He did not, however, think the inspectors likely to be appointed under the Nuisances Removal Act would be persons likely to be able to conduct the necessary investigation in order to detect adulterations. This was a department of medicine which was gradually growing up in this country. Was aware that by the 6th and 7th of William IV., chap. 37, the seller of flour proved to be adulterated was liable to be fined 20*l.* for each offence, and to have his name published in the newspapers ; and was also liable to a fine of 10*l.* if any adulterating ingredients were found on his premises. The seller of adulterated corn was punished, not for a commercial fraud, but for a fraud prejudicial to health. He thought that it should be in the power of the authorities in this country to say what substances were adulterations. They should publish a schedule of adulterations hurtful to health.

Some conversation ensued respecting the functions of the proposed examiner or officer of health, the appointment of the poor-law medical officers to that duty, also on the propriety of appointing a Central Board, as suggested by Dr. Hassall, but on which Mr. Simon had some doubt.

Sir J. Gordon, Mayor of Cork, as a public officer, said, he had devoted much attention to the question of adulterations. Had more particularly occasion to examine flour, especially wheat. From the high price of the loaf the poor people in the neighbourhood of Cork were in the habit of making their own bread. They bought what they called a "weight" of flour (7lb.), costing them from 10½*d.* to 1*s.*; 3½lb. would make a quartern loaf, so that, instead of paying 10*d.* for it, they got it for 6*d.* A complaint had been made to him (Sir J. Gordon) shortly after coming into office, of serious illness having been caused by the use of this flour. The complaints were inquired into, and it appeared the flour had produced the most violent gastric affections, and, on the persons who sold the flour being summoned, it was

found that the flour had been warehoused in England so long that it suffered decomposition. It was sent over to Ireland and there found unsaleable also; but, by mixing it with a certain quantity of bran and a small quantity of sound flour, it was sold in that state. A sample was examined by a most eminent chemist in Cork, and it was ascertained to be unfit for human food, the gluten being absolutely decomposed. There was a vast competition among a small class of millers as to who should produce the cheapest flour, as he obtained the most custom. The poor were very badly treated in Cork with regard to drugs. The guardians invariably took the lowest tender, and he (Sir J. Gordon) knew that many articles of the value of 1*s.* per pound were frequently put in at 6*d.* This was wretched economy on the part of the guardians, as the sick were not so speedily cured, and it would be to the interest of the district to obtain the best drugs at a higher price. He thought there should be officers appointed in every city to inquire into adulterations according to the extent of population.

Mr. Mitchell, Analytical Chemist, and author of a work on adulterations, said that in London his experience had shown him that in almost every substance there was an extensive adulteration.

The evidence of Mr. Mitchell was in substance similar to that of previous witnesses.

Robert Dundas Thomson, M.D., F.R.S., Professor of Chemistry at St. Thomas's Hospital, stated he had had considerable experience in the practice of adulteration, and more particularly in drugs and flour. With reference to coffee, he stated it was seldom to be obtained pure when ground, chicory being the most usual admixture; it was added to dilute it down to any price, and he did not consider there was any nutritious property in chicory. He had seen an apparatus employed for making substances, such as chicory, &c., to resemble coffee-berries, and it was considered very ingenious. It was very similar to a bullet-mould, and compressed the chicory, or whatever might be the substance employed, into the form of the coffee-berry, and the imitation was very good. It was pointed out as a very clever thing, and he believed it was registered. Dr. Thomson here produced some specimens of tea, and proceeded to say there was a substance like tea called "Beno Beno," which consisted of 14 per cent. of sloe leaves and 86 per cent. of catechu. He had also found one box of tea contain half its weight of iron filings. It was brought to him by the Lord Provost of a town in Scotland, and he had been told that in China this fraud was occasionally practised.

Witness gave a list of sweetmeats and lozenges adulterated with plaster of Paris, in proportions varying from 3 to 27 per cent.

The substance employed to flavour the sweetmeats was brought to him by a distiller, who wished to know what it was. He (Dr. Thomson) found it consisted of oil of grain, which is a strong poison. It is obtained during the distillation of grain in large quantities. It is amylic alcohol, and it would be very unsafe to take even a small quantity. Pineapple drops contain it. In reply to a question as to sausages, Dr. Thomson said, it had often been asserted that they were made of a peculiar species of meat—viz., horses' tongues. Indeed, he had reason to believe that the tongues of all the horses killed by the knackers were used for food.

On going into the question of water, it being four o'clock, the Committee said they would postpone the further consideration of the matters before them until Friday next, at half-past twelve o'clock.

THE STATE OF THE THAMES.

TO THE EDITOR OF THE TIMES.

Sir,—I traversed this day by steam-boat the space between London and Hungerford bridges, between half-past one and two o'clock; it was low water, and I think the tide must have been near the turn. The appearance and the smell of the water forced themselves at once on my attention. The whole of the river was an opaque pale brown fluid. In order to test the degree of opacity, I tore up some white cards into pieces, moistened them so as to make them sink easily below the surface, and then dropped some of these pieces into the water at every pier the boat came to; before they had sunk an inch below the surface they were indistinguishable, though

the sun shone brightly at the time; and when the pieces fell edgeways the lower part was hidden from sight before the upper part was under water. This happened at St. Paul's Wharf, Blackfriars Bridge, Temple Wharf, Southwark Bridge, and Hungerford; and I have no doubt would have occurred further up and down the river. Near the bridges the feculence rolled up in clouds so dense that they were visible at the surface, even in water of this kind.

The smell was very bad and common to the whole of the water; it was the same as that which now comes up from the gullyholes in the streets; the whole river was for the time a real sewer. Having just returned from out of the country air, I was, perhaps, more affected by it than others; but I do not think I could have gone on to Lambeth or Chelsea, and I was glad to enter the streets for an atmosphere which, except near the sinkholes, I found much sweeter than that on the river.

I have thought it a duty to record these facts that they may be brought to the attention of those who exercise power, or have responsibility in relation to the condition of our river; there is nothing figurative in the words I have employed, or any approach to exaggeration—they are the simple truth. If there be sufficient authority to remove a putrescent pond from the neighbourhood of a few simple dwellings, surely the river, which flows for so many miles through London, ought not to be allowed to become a fermenting sewer. The condition in which I saw the Thames may perhaps be considered as exceptional, but it ought to be an impossible state, instead of which I fear it is rapidly becoming the general condition. If we neglect this subject, we cannot expect to do so with impunity; nor ought we to be surprised if, ere many years are over, a hot season give us sad proof of the folly of our carelessness.

I am, Sir, your obedient servant,

Royal Institution, July 7. M. Faraday.

DESTRUCTION OF AN ELEPHANT.

The large elephant, 120 years of age, late the property of Mr. Wombwell, being incapable of locomotion from diseased feet, the present proprietor gave directions for its destruction in the easiest manner possible. Accordingly, Mr. E. Price, veterinary surgeon, and Mr. Flewitt, chemist, of Birmingham, on Friday last proceeded to carry his wishes into effect. In ten minutes from the application of chloroform, the animal became totally insensible; prussic acid was then administered without effect, and two large doses of strychnine without producing any perceptible feeling of pain. Not succeeding in these endeavours, a continuous application of chloroform was made, in the hope that the animal might sink under it; but after three hours' perseverance in this course, no difference of respiration being observed, the administration was stopped, and in one hour and a half all effects of it had passed away. The only known means of destruction left were the knife and the bullet. The latter was first tried (the animal again being chloroformed), and wounded a branch of the carotid artery, from which blood flowed in a tolerably sized jet. The opening was then enlarged by a knife, and the artery fully divided. In a few minutes the huge animal ceased to live, having died without a struggle or evidencing the slightest feeling of pain.—*Times, July* 23.

[The tenacity of life in this case is a remarkable contrast to the nervous susceptibility of the elephant in the Regent's Park. This animal was so much alarmed at the thunder-storm on the 14th of July, that she trembled with fear, refused her food, was attacked with diarrhœa, and died in rather more than twenty-four hours. She had previously been in good health.]

REVIEWS.

Pharmacopoea Austriaca. Editio quinta. Viennæ, 1855.

Pharmacopoea Norvegica. Regia auctoritate edita. Christianiæ, 1854.

While the subject of the Pharmacopœia is claiming the attention of Pharmaceutists as well as Physicians in this country, the alterations and improvements which are made under the guidance of modern science in the Pharmacopœias of foreign nations, cannot fail to be both interesting and instructive to the readers of

this Journal. The works before us are two of the most recently published of the continental Pharmacopœias. They are both written in Latin, and resemble each other in the general arrangement of the matter. There is no separation of the articles described under the heads of "Materia Medica" and "Preparations." Unprepared drugs and preparations are all included in one list, in which they are arranged alphabetically, according to their scientific Latin names. Thus, we have *Bismuthum subnitricum*, *Bolus armena*, *Bulbus Allii*, occurring together. Then we have *Tragacantha* next to *Tinctura vanilla*, and *Vanilla* next to *Unguentum Terebinthinatum*. This arrangement is becoming general in the Foreign Pharmacopœias. Formalæ are not given for the preparation of those chemical products which admit of a clear definition. In this respect the practice is similar to that which has been partly adopted by the London College of Physicians. If the practice be generally adopted, it will be necessary to have names and descriptions for the substances referred to which will leave no doubt of their identity. Thus, for instance, in the last London Pharmacopœia, we find in the catalogue of Materia Medica, *Potassii Sulphuretum*, with nothing to indicate what is meant by the name. It is true that if we refer to the previous Pharmacopœia we there find under the same name a formula for the preparation of the substance, which places beyond doubt what is meant, but independently of this, *Potassii Sulphuretum*, in chemical language, means one thing, and pharmaceutically it means a different thing. When the name is used, therefore, without any description, the meaning is doubtful. We greatly commend the method adopted in the Norwegian Pharmacopœia for describing chemical substances. First, the chemical name is given, then the formula expressed in chemical symbols, and, lastly, the centesimal composition. Nothing can be more precise and conclusive than this method of description. In the Austrian Pharmacopœia the descriptions are far less precise.

A Translation of the New London Pharmacopœia, *including also the New Dublin and Edinburgh Pharmacopœias, with a full Account of the Chemical and Medicinal Properties of their Contents; forming a complete Materia Medica.* By J. Birkbeck Nevins, M.D., &c. Second Edition.

In our notice of the first edition of this work, we found it necessary to allude to the apparently hasty manner in which it had been got up, and referred to this cause the errors which it contained, and many of which we specified. The short time which elapsed between the publication of the London Pharmacopœia of 1851 and that of "Dr. Nevins' Translation," which appeared in the same year, afforded some show of excuse for the absence of that accuracy which ought especially to characterize works that purport to supply "everything which is necessary for students in preparing for their examinations." Those who principally use such books being unable to distinguish that which is true from what is erroneous, it is the duty of reviewers carefully to scrutinize them, and fairly to point out their errors, especially when these relate to matters of fact, respecting which no differences of opinion exist.

Several years having passed since the appearance of the first edition of this work, and the author having, as he says in his preface to the present edition, derived assistance from the criticisms of some of the reviews which noticed his labours unfavourably, and having "spared no pains to render it (this edition) worthy of the favourable reception which was bestowed upon the first," we took up the volume before us with the confident expectation that, whatever differences of opinion may exist with regard to the general arrangement of the matter, it would at least be sufficiently free from error to justify us in recommending it as a safe guide for Pharmaceutical Students. In looking through the book, however, so many errors have presented themselves to our notice, that the ungracious task of pointing these out is again forced upon us.

The author has followed the arrangement adopted in the London Pharmacopœia, the Materia Medica being given in "Part 1," and the Preparations and Compounds in "Part 2;" but the Catalogue of Materia Medica, which constitutes the first part, is arranged in the form of a table, while the second part contains the descriptive notices of the several articles of Materia Medica interspersed among the preparations in which they are used.

The table of Materia Medica consists of nine columns, in which are respectively

indicated—1. Name for prescriptions; 2. Scientific name or description; 3. Natural order; 4. Linnæan class; 5. Linnæan order; 6. Whence obtained; 7. Properties; 8. Active principle; 9. Preparations. This method of arranging the Materia Medica for students is very useful, and the table would have been really valuable if it had been carefully and correctly prepared. How far this condition has been fulfilled, will appear from the following extracts, taken from different parts of the table, which we give literally as they appear in the table, only omitting those columns to which we do not require to refer :—

Name for Prescription.	Whence obtained.	Properties.	Preparations.
Acidum Sulphuricum ..... Sulphuric Acid (oil of vitriol), sp. gr. 1·843, *L.*; 1·84, *E.*	... ...	Refrigerant and caustic.	Acid. Sulph. Arom.
Aloe Barbadensis ..... Barbadoes aloes.	Barbadoes	Purgative, emmenagogue	Dec. al. co. Enema al. Ext. al. Ext. al. aquos. Pil. al. co. Pil. al. et assaf.
Aloe Hepatica ..... Hepatic Aloes.	East Indies	... ...	Pil. al. et ferri. Pil. al. et myrrh. Pil. al. c. sapon.
Aurantii cortex ..... Orange peel.	South of Europe	Arom., bitter tonic.	Conf. Inf., Inf. gent. co., Sp. am. co., Syr., Tinct., Tr. cinch. co., Tr. gent. co.
Ferri Sulphas venalis ..... Commercial Sulphate of iron (copperas).	... ...	Tonic	Pil. ferri co.
Hydrargyrum ..... Mercury, quicksilver.	Spain and California and China	... ...	
Limonum Cortex..... Lemon peel.	South of Europe	Grateful flavour ...	Tinct.
Opium (Turcicum)..... Turkey opium.	Turkey and Egypt.	Narcotic.....	Conf. op. (Elect. cat. *E.*, Elect., op. *E.*), Emp. opii, Enema, Ext. op., Vin. op., Pil. sap. co., Pil. styr. co. (Pil. plumb. op. *E.*), Pul. ipec. co., Pul. kino co., Tr. cam. co., Tr. op. (Tr. op. am. Troch. *E.*), Vin., Ung.
Potassæ bitartras ..... Bitartrate of potash. Cream of tartar.	Trieste and Marseilles.	Diuretic ..... Refrig. aper.	(Conf. sulph. *D.*, Dec. scop. *E.*), Pul. jalap. co. (Pul. scam, co. *E.*).
Potassæ carbonas ..... Carbonate of potash (pearl ashes).	America	Antacid	Dec. al. co.
Potassæ tartras ..... Tartrate of potash.	... ...	Not used internally	
Quinæ disulphas (sulphas, *E.*). Disulphate of Quinine.	... ...	Febrifuge, tonic.	
Resina..... Resin.	Sweden and America.	Rubifacient	Cerat. Empl.
Sapo mollis ..... Soft (sweet) soap.	... ...	Detergent and irritant.....	Enema Colocynth, Ung. Sulph. co.
Sarza (Jamaicensis) ..... Jamaica Sarsaparilla.	West Indies, Brazil.	Alterative	Decoct. et Dec. sar. co., Ext. sar., Liq., Syrup.

On referring to this table, the student would conclude that the only preparation of the Pharmacopœia, in which sulphuric acid is used, is acidum sulphuricum aromaticum, for which no formula is given in our Pharmacopœia; that Barbadoes aloes should be used in making compound decoction of aloes, and the other preparations placed opposite to it; that hepatic aloes should be used in the preparation of pilulæ aloes et ferri, pilulæ aloes et myrrhæ, and pilula aloes cum sapone, in none of which are those aloes ordered; that orange peel is an ingredient in sp. am. co.; that commercial sulphate of iron (copperas) should be used in making pil. ferri co.; that mercury does not enter into any of the "preparations" of the Pharmacopœia; that tinctura limonum is the only preparation in which lemon peel is ordered; that Turkey opium comes from Egypt as well as from Turkey; that bitartrate of potash is not used in making potassio-tartrate of iron; that the potassæ carbonas of the Pharmacopœia is American pearl ashes, which should be used in making compound decoction of aloes; that tartrate of potash is not used internally; that there is no preparation of disulphate of quinine in the Pharmacopœia; that common resin comes from Sweden and America; that soft soap does not enter into the composition of any of the pills of the Pharmacopœia; and that Jamaica sarsaparilla comes from Brazil as well as from the West Indies. In fact, so numerous are the errors of omission and commission throughout this table, that it is only calculated to mislead those who refer to it; and, strange to say, while some of the errors of the first edition have been corrected, others have been introduced for the first time in this edition of the work. Thus, in the first edition, the author was satisfied to name Turkey as the place from whence Turkey opium is obtained, fewer errors were made in assigning the different aloes to the preparations in which they are ordered, and no mention was made of the properties of tartrate of potash.

Much of the inaccuracy of the above table must have resulted from inadvertence; yet on turning to another part of the book, at page 307, under the head Extractum Aloes Barbadensis, we find "*Medicinal properties and uses.* See Decoctum Aloës Comp."—"*Officinal preparation.* Compound extract of colocynth." At page 305, in some preliminary remarks on extracts, it is stated:—"Some substances, as jalap, which contain resinous constituents, yield them only to proof spirit, which is therefore employed as water is in the other cases." And further on, we are told:—"In many plants, as belladonna and hyoscyamus, the active principles reside in their juices; and they are therefore crushed and pressed in an hydraulic press, until the whole of the juice is forced out, which is afterwards evaporated. In others, as lettuce or elaterium, the active principles reside in a juice which exudes when the plant is wounded; *and it is this juice alone which is evaporated to form the extract.*" We have marked by italics the remarkable part of the last sentence. Again, under the head of "Extractum Glycyrrhizæ, L. D. E.," we find "*Synonyme.* Spanish or Italian juice." And in the "*remarks*" which follow, it is stated, "This is a well-known extract, &c. * * * It is usually imported from Italy, &c." * * * Thus confounding two very different preparations. In the remarks on the process of the Pharmacopœia for Extractum Opii, it is stated:—"By maceration, water dissolves the odorous principle of opium, the salts of morphia and codeia, the narcotine, and the gummy and extractive matters;" yet the process usually adopted for getting narcotine, consists in treating with acetic acid the pressed residue of the opium, after it has been exhausted with cold water, in which the narcotine is insoluble.

The existence of inaccuracies such as we have pointed out is much to be regretted, as the work contains a great deal of useful matter, especially in relation to the action of medicines. Should it reach another edition, we trust the defects we have alluded to will be removed, and Dr. Nevins's book will then become a valuable addition to our Pharmaceutical literature.

BOOKS RECEIVED.

An Essay on the Teeth and Dental Practice. By Thomas Lukyn. This edition, revised, corrected, and considerably enlarged and illustrated with wood-cuts, including a portrait of the Hippopotamus. Dedicated to the Members of the Medical Profession. 8vo, pp. 88. Partridge and Oakey, 34, Paternoster Row, and 70, Edgeware Road.

RUDIMENTS OF PATHOLOGICAL HISTOLOGY. By CARL WEDL, M.D., &c. With 172 Illustrations on Wood. Translated and edited by GEORGE BUSK, F.R.S. London: Printed for the Sydenham Society. 1855.

THE HALF-YEARLY ABSTRACT OF THE MEDICAL SCIENCES. Edited by W. H. RANKING, M.D., &c., and C. B. RADCLIFFE, M.D., &c. Vol. xxi. January—June, 1855. London: John Churchill. Edinburgh: Maclachlan and Co. Dublin: Fannin and Co.

TO CORRESPONDENTS.

THE PERCENTAGE SYSTEM.—The following letter has been received with a copy of a small work. It is a curious specimen of a system which we have had occasion to expose in this Journal. We omit the name and address :—

"SIR,—I have taken the liberty of enclosing for your acceptance my *Essay on the Teeth*, a work treating generally on Dentistry, and beg to inform you that for some time past I have made it a practice to remit gentlemen in your profession 15 per cent. on the amount received through their recommendation. Respectfully soliciting your favours on these terms,

"I am, Sir, your obedient Servant."

A. B. C. (Derby).—Syrups may be filtered (hot) through flannel.

A. C. (Evesham).—*Collodion*, vol. viii., p. 524.

Chemicus (Newcastle).—*Scent for Pomatum:* Essences of bergamot, lemon and jasmin, oil of lavender, otto of rose, &c., in any proportion that may be preferred.

R. (Bath) should write to the Secretary, giving his name and address.

Adolescens (Long Sutton).—Ditto, see vol. vii., No. vii.

J. F. (Castle Dorrington).—Aluminium cannot at present be purchased in this country. We understand the Paris Exhibition contains some interesting specimens of this metal. See page 80 of this number.

G. C. A. (Portsmouth).—Yes.

W. W. W. (Wolverhampton).—(1). Chemist.—(2). The term patent is often used without authority as a puff.

W. S.—Cough Lozenges:—Inspissated juice of black and red currants, 8 oz.; ipecacuanha, 30 or 40 grs.; tragacanth, 90 gr.; mix and divide into 240 lozenges.

R. H.—(Hempsted).—No licence is required for the sale of cocoa.

A Dispenser (York).—We are unable to give any information on the subject.

Mr. Radley (Sheffield) will observe that the subject has not escaped our attention.

M. P. S. (Sheffield) objects to the remarks in our last number, on the case of Dixon *versus* Bell, and is an advocate for FREE TRADE to the full extent, both in medical advice and in the supply of medicines.

A Member (Cheltenham).—The newspaper containing the advertisements has been received and will be preserved.

W. M. (Highbury).—It is illegal to sell drugs *to brewers* with a knowledge of the fact.

A.B. (Wymondham).—Fownes's *Elements of Chemistry.*

J. E. A. L. (Hull).—The Director of the Army Medical Board, 13, St. James's Place, London.

W. H. Cole.—We beg to acknowledge the receipt of the note of Messrs. Powers and Weightman.

An Old Member.—Soak the isinglass in a little water, then dissolve it in the tincture. Apply it to the fabric or leather with a brush.

Cinnabar.—Cinnabar of antimony means bisulphuret of mercury. It was formerly obtained in the process adopted for the preparation of butter of antimony, the "cinnabar," or bisulphuret of mercury, being the residue left in the retort in that process.

CORRIGENDUM.

In last month's Journal, page 21, line 17, for *Cochlospurmum* read *Cochlospermum.*

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. SMITH, Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XV.—No. III.—SEPTEMBER 1st, 1855.

THE ADULTERATION OF FOOD, DRUGS, &c.

The evidence on this subject, of which we have given only a condensed abstract, occupies more space than we had intended to devote to it. The facts are so copiously diluted with conflicting opinions and contradictory statements, that much sifting is necessary in order to arrive at a correct appreciation of the whole truth. Without imputing intentional inaccuracy to any of the witnesses, we can only reconcile the apparent incongruities in their testimony by considering the several aspects under which the subject may be viewed, and the bias which a different colouring may give to the same picture.

In the first instance the medium of inspection was very black. Dr. Hassall and Dr. Normandy led the van, and "did a tale unfold" which threatened to create a panic in the provision and drug markets. Mr. Warington corroborated some of the statements, Dr. R. D. Thomson followed with a long catalogue of frauds, and other witnesses on special subjects brought up the rear, completing what might be termed "the case for the prosecution."

That many important facts were elicited by this inquiry, and that the prevalence of abuses, as well as the injury to the public, resulting from them, demanded the attention of the Legislature, were propositions neither disputed nor admitting of doubt. But it was obvious to those who took a dispassionate view of the subject, that the case had been over-stated, and a good cause in some degree injured by gratuitous exaggeration, and by assertions which, although founded in fact, could not be fully substantiated.

Other testimony was required to place the question in its true light. Messrs. Redwood, Herring, and Scanlan, and Dr. Letheby, while corroborating the previous evidence to a certain extent, repudiated, on the part of the respectable portion of the several trades implicated in the inquiry, the general denunciation which had been passed upon them. Mr. Phillips (of the chemical department, Inland Revenue) gives some practical information founded on personal experience in his office; and his evidence, as well as that of some other witnesses, is calculated to moderate the intensity of the cloud which seemed to overshadow the inquiry at its early stages. While the evidence was finding its level before the Parliamentary Committee, some of the principal actors in the drama were finding their level out of doors by a process of fermentation, which took the form of a published correspondence, and elicited some rather curious disclosures.

It had been for some time past currently believed that the Analytical Sanitary Commission, instituted by the editor of the *Lancet*, consisted of Dr. Hassall, and that the reports published in that journal were the result of his original researches. As an acknowledgment of these services rendered to the public, a testimonial to Dr. Hassall had been proposed, and subscriptions to that object collected.

The account given by Dr. Hassall in his evidence before the Committee respecting the origin and progress of his labours, in connexion with the "Analytical Sanitary Commission," tended to confirm the previously existing impression. To this an anonymous correspondent in *The Times* raised a demur, and was answered by Dr. Hassall as follows :—

TO THE EDITOR OF THE TIMES.

Sir,—Your correspondent in his letter of to-day has somewhat contravened the spirit of his excellent motto, *palmam qui meruit ferat.*

This letter contains certain inaccuracies, which, as they relate to a subject now of public importance, and concern closely myself, I beg to be permitted to rectify.

I will notice the several points of the letter in the order in which they occur.

The Analytical Commission of the *Lancet* took its origin under these circumstances :—

Early in 1850 I read a paper on the subject of coffee and its adulterations, in which I recorded the results of the application of the microscope to the detection of adulteration, before the Botanical Society of London. A very favourable notice of this paper appeared in nearly all

the daily journals, including *The Times*. I forwarded the original article itself to the *Lancet*, and proceeded to follow up the subject by preparing another report on sugar, intended for the same society. After a time Mr. Wakley, with whom I had not previously held any communication on the subject, wrote to me, and asked me whether I thought a series of articles could be so prepared as to admit, without very great risk, the publication of the names and addresses of the parties of whom the goods analyzed were purchased? I replied that they could, due caution being exercised. I then engaged to furnish the articles, Mr. Wakley devising the title under which they were to appear, and undertaking to publish the names—a very bold proceeding, and one entitling him to the highest praise.

In conformity with this engagement, I supplied the reports for a period of four years. I employed my own agents in the purchase of the samples, accompanying them on all occasions myself, for greater security. I made all the necessary investigations, microscopical and chemical, unaided, except latterly in some few instances, where extra chemical assistance was required, or where a second opinion on a chemical question was requisite. I determined the order of the several reports, and I wrote them all, with a single exception, up to the expiration of the four years, when, acting under a written agreement with Mr. Wakley, I published them in my own name, under the title of *Food and its Adulterations*.

The manner in which these inquiries were conducted, may be judged of by the fact that, although some thousands of analyses were made and names published, in one instance only was an action brought, and this was abandoned at an early period. In republishing, with additions, the reports in my own name, I incurred the whole expense and also the responsibility of the renewed publication of the names.

In these inquiries no one was associated with me; but during the latter part of the period, I was authorized to employ, to a certain extent only, chemical assistance when necessary, and in the exercise of this discretion, I employed my friend Dr. Letheby, whose services I had much pleasure in acknowledging in my work.

Such is a brief sketch of the origin and history of the Sanitary Commission of the *Lancet*.

I will now, in as few words as possible, point out the inaccuracies contained in your correspondent's letter. He writes :—"A poor artist of the name of Miller made the microscopic examinations and drawings." Mr. Miller, who had been in my exclusive occupation for many years of his life, and who was specially educated as a microscopic artist by myself, made, in my own house, and under my own immediate instructions, the necessary drawings, but he did not, as stated, make the microscopic examinations, for which, indeed, he was not competent; neither is it correct to say that Dr. Letheby "conducted all the important chemical analyses."

Having made these material corrections, may I ask, after having assigned the chemical investigations to Dr. Letheby, and the microscopical examinations and drawings to Mr. Miller, what part either of the work or of the merit your correspondent reserves for me, which would justify the eulogium which, at the same time, he is pleased to confer on me?

I have the honour to remain, your very obedient Servant,

ARTHUR H. HASSALL, M.D.,

Bennett Street, St. James's Street, July 26. Member of the Royal College of Physicians.

This letter led to a rejoinder from Mr. Wakley (dated July 28), who stated that he had entered upon the subject as early as 1830, and employed other parties in the investigation prior to his association with Dr. Hassall; that he contributed all the requisite funds, and incurred the responsibility arising from the publication of names, and gave Dr. Hassall a liberal salary for the services performed. A letter from Dr. Letheby, dated July 27, also appeared in *The Times*, controverting some of the statements of Dr. Hassall. Dr. Letheby says,

As early as the month of June, 1851—that is, directly after the commission began its labours—I was requested by Dr. Hassall to give him assistance in his investigations; in fact, on the 14th of that month he forwarded specimens of cocoa ash for analysis, for he could not say exactly what the nature of the colouring matter was. Before the year was out I had examined all the samples of bread, flour, and salt which were necessary for his reports on this subject.

From that time until the present I have been in constant communication with him—directing him in the conduct of all the unimportant chemical analyses, and I myself making every one of the difficult and important ones. In truth, he invariably wrote to me when he began a new inquiry, and asked for instructions how he was to proceed with the chemical part of the investigation. In many cases, indeed I may say in most, he got just far enough with the inquiry to become embarrassed, and then his products were sent to me for completion, or his results for correction. Latterly, as he most truly says, I have been constantly engaged with him; and, to speak the truth, I have made hundreds of analyses for him.

In conclusion, I will put it to any practical chemist whether it was possible for any man to proceed with an important research who would ask such questions as the following?

"Will you kindly give me the process for the quantitative analysis of iron? Is the Prussian blue which subsides on the addition of ferrocyanide of potassium soluble in excess of the precipitant?"

Again, after having received instructions from me respecting the examination of porter, he says:—

"I am getting on very well with the porters; but one difficulty which presents itself to me is the best method of detecting sulphate of iron in porter. It would not be thrown down, I believe, either by the acetate of lead or the sulphuretted hydrogen used, in which case, if present in the porter, it ought to be found in the sugar obtained by the evaporation of the fluid portion of the porter freed from acetate of lead. Is this so? A line to steer me right in the matter would greatly oblige."

I have many such questions as these. They are in Dr. Hassall's own handwriting; and I regret he has made it necessary that I should allude to them.

To this letter Dr. Hassall wrote a reply, in which he gave a different complexion to the affair, entering rather minutely into some of the circumstances, and repeating in substance his previous assertions. The most important additional statements are the following:—

I employed my own agents to purchase the samples. I accompanied them on all their journeys, I made the whole of the microscopical investigations, and the larger part of the chemical analyses; I wrote all the reports, with a single exception; and I afterwards published, in accordance with my written agreement, with my own name attached, the whole of the reports at my own cost. The republication of these involved an expense of £800, and I had to furnish my publishers with an undertaking to meet all actions which might arise out of the renewed publication of the names and addresses.

* * * * * * * * *

I will now proceed to show from the following statement what Dr. Letheby really did in the way of chemical analysis. Exclusive of an introduction of 40 pages, my work contains 647 pages of letterpress, and it embraces the reports which were published relating to food in the years 1851, 1852, 1853, and 1854. I find that 25 reports appeared in 1851—these embraced 1054 analyses, microscopical and chemical, and they occupy 368 pages of the work; that 20 reports appeared in 1852, embracing 512 analyses, the last of these reports extending to page 514; that in 1853 seven reports were published, containing 540 analyses, and terminating with the 600th page of the work; lastly, that in 1854 three reports only appeared, containing 291 analyses. The first year Dr. Letheby made 16 analyses, the second 9, the third 59, and the fourth 12 analyses—that is, in all 96 as against 2287—a large proportion of which analyses were both microscopical and chemical.

Besides the reports contained in my work four other reports were published in the *Lancet* on drugs, and two others were prepared on articles of food, but were not published; these contained 228 analyses, of which 57 were made by Dr. Letheby; of the analyses conducted by Dr. Letheby, the greater part were confined to two articles—viz., snuff and opium, there being 43 samples of the former and 57 of the latter.

Dr. Letheby, in a letter dated July 31, gives the following version of the case:—

TO THE EDITOR OF THE TIMES.

SIR,—I really am ashamed of the circumstance which calls for another letter from me on the subject of Dr. Hassall's inconsistencies. In his letter of the 27th inst. he distinctly stated that in the inquiries of the *Lancet* Commission "no one was associated with him; but, during the latter part of the period, he was authorized to employ, to a certain extent only, chemical assistance when necessary, and, in the exercise of this discretion, he employed his friend Dr. Letheby, whose services he had much pleasure in acknowledging in his work;" from which it must be inferred that my assistance was not had, or needed, until the latter part of the inquiry. Now, however, that Mr. Wakley has exposed the true position of Dr. Hassall, and even stated that he paid "several sums for chemical analyses made by Dr. Letheby," Dr. Hassall admits that, during the first year I made sixteen analyses for him, during the second nine, during the third fifty-nine, and during the fourth twelve; besides making forty-three analyses of snuff, and fifty-seven of opium.

On looking over my laboratory book, I find that during the four years alluded to I made 291 analyses for Dr. Hassall, of which thirteen were for adulterations of chicory and cocoa, twenty for bread, flour, and salt, eleven for bitter beer and pale ale (these being all the analyses necessary for the report on this subject), seven for vinegar, twenty-five for tobacco, forty-five for snuffs, sixty-three for opiums, ten for confectionery, four for cod-liver oil, and about twenty for castor oil; the rest were, for the most part, of things which did not immediately concern the Commission; they were of matters which he had received for examination in the way of business, and which he could not investigate. Others were for his review of Dr. Golding Bird, in the twelfth volume of the *British and Foreign Medico-Chirurgical Review*, where they are published, with a mere apology in the way of acknowledgment; and others were for a paper of his which was read before the Royal Society, and printed in their Transactions. Indeed, I think it but right to say that the whole of the chemistry of that paper is a *verbatim* copy of my notes to him on the subject; and when he sent the proofs to me for correction, I do assure you I was astonished at the boldness of his conduct, and I made such corrections in his statements as I

thought just to myself. I have not seen the paper since it has been printed for the members, and am therefore ignorant of the way in which he used my corrections.

In addition to this, I have nearly 100 letters of his in my possession, which show that, while my analyses were really all the important and difficult ones of the commission, I furnished him with specific directions for the conduct of all the others. I say, therefore, with Mr. Wakley, that the course which Dr. Hassall has lately pursued has placed him in a false position, and that it is one which scientific men must deeply regret.

One word more, and I shall have done. Dr. Hassall states that up to the last few days we have been in friendly communication, and that no word of dissatisfaction has escaped me. This is not strictly true; for when, at the onset of the testimonial affair he wrote to me, and asked me to go to his house and have a private meeting with one or two of his friends respecting the getting up of a testimonial to him, I wrote a strong letter of censure to him, and not only declined to have anything to do with the business, but told him what would be the consequences if he persisted in such a foolish step. My prophetic warning has been realized: his true position has been made clear, and his friends have dropped from him in disgust. Since then we have not been in what can be called friendly communication, for all our correspondence has been confined to matters of business. Dr. Hassall knows, as well as man can know, that I have had but one object in serving him, and that if his conduct had not been open to the censure which I have passed upon it, he would still have had all my assistance in helping him.

I remain, Sir, yours obediently,

London Hospital, July 31. H. Letheby, M.B.

Leaving our readers to draw their own inference on the merits of the question raised by the correspondence, we need only advert to the mode of explaining the apparent inconsistency in the evidence adduced before the Committee. This is a case in which the conclusions arrived at are likely to be greatly influenced by the *animus* with which the inquiry is undertaken. The field of investigation is interminable. Low neighbourhoods and shops of a certain description furnish a supply of fabricated or inferior articles to any extent which the collector of such materials may desire. Even in other districts, and in houses of reputed respectability, similar examples may be found, arising from accident or from some conventionality between the tradesman and his customers. Some of these delinquencies have probably for years passed unnoticed, because the public attention has not been called to them, and an exposure of the fact has, in many instances, resulted in a discontinuance of the evil. Those witnesses who entered upon the subject for the express purpose of making a collection of frauds and abuses, with a view to the introduction of a legislative enactment as a remedy, would naturally dwell upon the dark side of the picture, and credit is due to Dr. Hassall and Dr. Normandy for their indefatigable zeal in the search for adulterated and impure specimens. It is equally true, as stated by Mr. Redwood and some other witnesses, that drugs and chemicals, as well as other articles of consumption, may be obtained pure, or as nearly so as may be requisite for practical purposes, by those who desire to have them, and take the proper means for attaining their object. It is also true that the practice of systematic adulteration, especially in the drug trade, is less extensive than it was formerly—a circumstance resulting from improved education, and the publication of cases of fraud with the means of detection. The wholesale druggists and manufacturers have experienced a notable change in this respect, and we have heard complaints of the increasing difficulty which they find in satisfying their customers, who, instead of receiving what is furnished to them without examination, are more on the alert, and frequently return articles if they appear not to come up to the requisite standard.

We have heard it remarked, that some of Mr. Redwood's observations had a tendency to justify or extenuate adulteration in some cases. We think his evidence will not bear this construction. Mr. Redwood followed two or three witnesses, whose highly-coloured statements were calculated to give an erroneous view of the case, which it was obviously his intention to place in a more practical and correct light. It is necessary to make a distinction between the term "purity," used in a chemical sense, and when used with reference to practical experience and the ordinary requirements of the public. *Absolute purity* is only attainable at great expense, and, except for the purposes of chemical experiment, is neither necessary nor worth the cost. Purity sufficient for the ordinary requirements of the public, may be attained by the exercise of vigilance and discretion in the

purchase, by paying a fair price, and dealing with respectable tradesmen. But the public in general are not fully informed respecting the precautions to be taken in all cases, and the mode of detecting fraud. Publicity on this subject is therefore one of the most effectual modes of counteracting the existing evils, and if to this remedy were added an easy and inexpensive mode of bringing the guilty parties to justice in cases of wilful imposition, the public would possess all the protection which is required, or which could be practically afforded.

It must be admitted that in many of the flagrant cases of fraud which have been exposed, the purchasers are themselves responsible; for if a powder be offered at half the cost of the raw material in the whole state—if any commodity be sold at a price at which it would be impossible to procure it genuine, or if it be required of a colour not naturally belonging to it, the purchaser must either be labouring under culpable ignorance, or he is cheated with his eyes open—

"For sure the pleasure is as great
In being cheated, as to cheat."

The Parliamentary inquiry will be resumed next session.

RECREATION AND EDUCATION.

An occasional respite from labour is salutary to body and mind, and the month of September is usually selected for this purpose by medical and pharmaceutical students. The term Pharmaceutical Student is of recent origin. The class to which it refers has been called into existence by the requirements of the age, and is gradually increasing numerically, and rising in importance. In a few years, many young men who are not yet sensible of the value of education, will discover their mistake, and regret their want of worldly wisdom. They will find that others, who have kept pace with the times, are in a better position than themselves, and enjoying the reward of their industry. If any confirmation of this remark were required, we need only refer to the evidence before the Parliamentary Committee on the adulteration of food and drugs. Several witnesses bore testimony to the effect which has already resulted from an improvement in pharmaceutical and scientific education, in lessening the evils in question. The public being aware of the importance of this subject, and being continually reminded of it by disclosures in the committee-room of the House of Commons and elsewhere, there is every reason to believe that the branches of knowledge which appertain to the business of a Pharmaceutical Chemist will be more appreciated, and that the patronage of the public will be bestowed where the most efficient services can be obtained.

The arrangements of the School of Pharmacy in Bloomsbury Square will continue in force during the ensuing session. The lectures on Chemistry and Pharmacy by Mr. Redwood, and on Botany and Materia Medica by Mr. Bentley, will be delivered as before. The Laboratory will be open to Students at the commencement of October, and further particulars will be published in our next number. The library of the Society will also be open during the day, and between the hours of eight and half-past ten in the evening. When the early closing movement was under discussion last year, one of the strongest arguments urged in its favour was the importance of allowing young men time for reading, either at home or in the library of the Society. The hours of business were very generally reduced with a view of affording the desired opportunity for improvement. The librarian had instructions to light the gas, and prepare the library for the reception of Students at eight o'clock; and arrangements were made for the circulation of books for the convenience of those residing at a distance. But we have never heard of the library being over-crowded, or the books much in demand. The same privileges continue to exist, and their importance is as great as it was when the eagerness of young men to study was brought forward as a reason for early closing. But where is the zeal of the Students now that the opportunity is afforded? Are they ignorant of the advantages offered to them, or are they indifferent on the subject? Let us hope

that the arguments and professions which promoted the early closing of the shutters, will be exemplified and carried into practice, and that the favourable symptoms will be renewed when the next session commences.

THE SALE OF SPIRIT OF WINE.

We have been favoured by the Board of Inland Revenue with an abstract of the recent Act and regulations respecting the sale of Methylated Spirit. As this is an official document, and likely to interest many of our readers, we have published it entire in another part of this number. The passing of this Act may be taken as an indication of a desire on the part of the authorities at Somerset House to afford every possible facility to the British manufacturer in competition with those of other nations. The nature of the regulations will serve to show the difficulty of attaining this object without interfering with the revenue in cases to which the indulgence is not intended to apply. To persons inexperienced in the operation of the Excise laws, and the artifices resorted to for their evasion, the object of some of the restrictions on the purchasers and vendors of Methylated Spirit may be scarcely intelligible. We may, however, conclude that these precautions are founded on experience; and although the operation of the new law will be in some degree limited by the conditions under which its advantages are offered, it must be received as an experiment, or an instalment, the continuance and extension of which will depend upon circumstances. Under the existing regulations the benefit will be enjoyed chiefly by the wholesale manufacturer or dealer, as the regulations are not applicable to all the circumstances under which the retailer would desire the privilege—such, for example, as the sale of the spirit by retail for burning, and for scientific purposes, or its use in small quantities for processes conducted on too limited a scale, to make it worth while to submit to the restrictions. Those who, from the above cause, do not avail themselves of the existing regulations, will be comparatively in a worse position than before, from their inability to compete with others who use duty-free spirit.

This was our impression on reading the provisions of the Act; we are, however, informed that it is the desire of the authorities to extend the privilege as widely as possible. But in this, as well as other similar cases, it is extremely difficult to devise regulations which will have the full effect desired, without opening the door to abuses and evasion of the law. The present experiment is not unattended with risk; as a temptation might exist to use the spirit for purposes not contemplated by the Act, and highly improper—as in making tinctures and other preparations, from which the spirit is not afterwards separated by distillation. Such practices should be discountenanced and (if detected) exposed by all respectable members of the profession, for the general good; as the prevalence of abuses or fraud might lead to a repeal of the Act, and the consequent loss of the advantages now granted. To the large manufacturer, the advantage will, we should think, more than counterbalance the inconvenience arising from the peculiar restrictions under which the spirit is to be received, registered, sealed, and used; and as these conditions are considered necessary, we have only to express a hope that the experiment will be attended with success, and that it may be found practicable and expedient to extend the privilege more generally in the trade. We take this opportunity of noticing the inconvenience to which the Retail Chemist is exposed from the demand for rectified spirit for photographic processes, now very generally performed by the public. A pure spirit of a certain strength is required; there is no source to which the public can apply for it with confidence, except to the Chemist; and he is prohibited from supplying it, *unless for medicinal use.* In the present case the remission of the duty is not the source of complaint; but the inconvenience consists in the absence of any channel through which the public can legally obtain the kind of spirit required.

ORIGINAL AND EXTRACTED ARTICLES.

SECRET FORMULÆ.

BY MR. JOSEPH INCE.

When a young man commences business for himself, the ordinary course of events shapes his career as follows:—He rents a moderate shop, adorns it after his own private fancy, rises early, works very hard, and does his best to please his customers. He has usually the sense to take a wife, in order to brighten the general prospect; and arduous as his toils may be, he yet feels happy in the contentment arising from independence. At first the labour is great, and the remuneration consequently small; but by degrees, anxiety is replaced by an honest confidence in his own resources; trade begins to flourish, friends to multiply, and a well-earned reputation attaches itself to his establishment. This is the Arcadian moment when his bliss attains its climax. Trust not, presumptuous mortal, it will so last for ever. No—even as we write, a deputation, bearing a printed circular, waits on the successful venturer; and their leader, who has caught no little of the romance of his own immediate neighbourhood, makes the following neat address:—

Respected Chemist! You have succeeded—tell us how you did it? Your preparations are better than other people's—how do you make them? Your house has become noted for its specialities—give us the receipt. This is a transition era—the age of large-minded, far-seeing, comprehensive views. Away with the narrow-mindedness in which you have slept for years! Hoard up for yourself no longer the profitable secrets of the past. Throw open to the light of day your private formulæ; and though in so doing you may incur the trifling inconvenience of sinking down to the common level, rise to the full consciousness of the glorious thought that Science will be exalted, and the new régime advanced." "Gentlemen," replies the astonished listener, "I am an honest, unpretending man, so let me die in peace." The deputation smile contemptuously, and descant upon Physicians knowing the preparation of everything they prescribe, the gain to the public of diffused intelligence, and the resulting higher standard of the community of Druggists. In vain the desponding hearer urges in self-defence that there are certain technicalities of manufacture (like a patent right), to disclose which would simply injure the revealer, and leave science where it was; that as there are specialities limited to medicine as a profession, there are others also that belong to chemistry as trade. Moreover, that Pharmacy and Medicine both present such ample fields of investigation, that to wander far out of either is not wise, and that the truest friendship between the Druggist and Physician must exist where both are honourably, harmoniously, but separately working in their own respective spheres, remembering always that there *is* a point where the profession ends, and trade begins. In vain he hints that the only benefit from discarding all secret formulæ would be reaped by those who are eager to snatch an easy reputation from their hard-working neighbours, but who have feared hitherto to admit even a little knowledge into their operations, since Lord Bacon said it was a dangerous thing. No matter how many perish in the flood, so that it float their ark. Endless might have been the interview, had not Mrs. Chemist demonstrated to the deputation the use of the street-door, as a means of egress; and the same night she performed for that time only, by particular desire (her own), the melody that concludes with the touching caution,

"Of such nightingales' songs beware."

A revival has sprung up in these later days, whose universal influence has affected art, science, men, morals, national institutions, manual industry, and every shape of enterprise. Its impetus is education. Pharmacy in turn has shared the surrounding movement. The world is content no longer with the

routine of its forefathers, and seeks out a higher law than custom for its standard. This is the history of the New Pharmacopœia. The College has sought to produce a work whose formulæ shall bear the trace of recent progress —whose rules shall be dictated not by unheeding commonplace, but by the accurate information modern research has offered—based upon whatever Pharmacy with its practical wisdom, Materia Medica with its endless developments, or Chemistry with its helpful combinations, can contribute. To accomplish this, the College, with generous confidence, invites the assistance of those whose daily experience renders them well adapted to give useful and sound advice, and in this manner seeks to avoid one source of error, namely, that which must arise from undirected theory. A duly appointed committee has commenced its labours, striving to gain all information tending to form a correct, authenticated Materia Medica; glad to receive suggestions towards the improvement of existing formulæ, derived from actual observation; and determined energetically to remodel the defective, to expunge the obsolete, and to add whatever the new circumstances of Pharmacy demand. The advantage that will accrue is obvious. Chemists will feel a personal interest in the art of healing, Physicians will have reliable preparations at command, and the public will have a better chance of being cured than they possess at present.

Two different views have been entertained with regard to the Pharmacopœia: some reverence it as the Bible, others think it nonsense. Without falling into either of these extremes, the most ordinary common sense will at once perceive that the only facts desirable to be included in its formulæ are those that bear a direct influence on the advance of Pharmacy. The Pharmacopœia is not in itself a text-book of instruction; it becomes so indirectly, but this is not its essential character. Its primary intention is not to teach Chemistry, Botany, or Materia Medica, but it is simply an authorized statement of the best methods of preparing medicinal remedies. Nevertheless, these methods mainly depend on the application of the three branches of science just enumerated, which leads us to a sentiment which may seem harsh, but which the event will certainly confirm, that the number of Chemists and Druggists who are in the position to contribute genuine information is extremely limited.

The discipline of long-continued, well-applied, intelligent experience, united to a thorough competent appreciation of recent discovery, alone can constitute a true adviser. Such men and facts the College wants. Now let us have a clear understanding what it does *not* want.

The cause of Pharmacy is not materially advanced by the remarks that naturally suggest themselves from the contemplation of Fownes's Chemistry and Christison's Dispensatory. These excellent works are already in the hands of medical men, who, had they now stood in need of such information, would not be in the position they at present occupy. Still less are therapeutic interests conserved by the introduction of those extraordinary seeds, oils, herbs, and other recondite specimens of Materia Medica, the names of which nobody can pronounce, the history of which nobody knows, and the value of which nobody appreciates but the advertiser. Neither is Pharmacy advanced by too learned disquisitions about simple things; and, lastly, it is in no way promoted by the publication of secret formulæ. These recipes belong to trade, essentially and exclusively. They are not regulated by science, neither do they pretend to be; but are the result, sometimes of patient observation, oftener of accident; sometimes of manufacturing tact, oftener of unintentional mistake. They belong in general to old-established houses, for the sole reason that time, frequent opportunity, and hereditary experiment have favoured their completion. To divulge their peculiarities would establish no law, confirm no opinion, and illustrate nothing except the extreme folly of the divulger. They are a means of living, the source, not of some trifling gain, but wealth; and should any weak enthusiast, influenced by temporary vanity, or a totally erroneous view of the subject, unveil those formulæ which constitute his business, the Benevolent

Fund might enrol him as a certain applicant for charity, unless St. Luke's stepped forward with a previous claim.

There is a pathway open to the humblest Chemist, that will conduct him alike to fortune and a reputation. Let him, whilst carrying out the ordinary duties of his business in their minutest details, not be frightened to enlist the aid of those advantages which his fathers never had. The true transition element is knowledge; to neglect it, is to shut up the best avenue of hope, and in this age of competition, to render the bare chance of living daily more precarious. The apprentice may be pardoned for his inability to see any connexion between abstract study and his future prospects; but he will be better able to judge ten years hence. The use of such application is not to fill him with inflated notions, set him above his business, and place him in the Professor's chair, but to give him the grasp of circumstances—to rescue his shop from struggling mediocrity—to teach him how to avail himself of every new discovery for commercial purposes without interfering in the least with the stern and often prosaic duties of his calling—and if it succeed in this, the lessons of Liebig will prove as valuable as washing bottles. Haply, some well-meaning counsellors (without a signature) will favour him with fiery letters, which he will consign, in *statu effervescentiæ*, to their appropriate element; or, perchance, a nameless brother may describe, in picturesquely worded phrases, his progress to the workhouse, whilst an occasional Anglo-Saxon, proud of his Lindley Murray, may join in approving chorus. Fear not, courageous friend! but when the strife of words is at the highest, think of the saying of the great artist, William Etty, "To faint and loiter, when only a little effort!"

Should your lot be to dwell amidst the rush and roar of city life, let no one blame you for discovering chemistry of more use than hair-oil, and cattle a subservient interest. But should the country be your appointed sphere, there you will be better able to dip sheep, and give befitting drinks to cows and horses, because you can analyze the soil on which you tread, and are not wandering on at the mercy of whatever the London wholesale houses choose to send you.

Saved from the weariness of an empty mind, you may derive additional comfort from the fact that your name will soon increase your demand for even fancy articles and scented soap, and that the fresh-coloured country lasses are not displeased with a retort, whenever it is a good one.

Whilst spectral Pharmaceutists track your footsteps in their shrewd, groping manner, in the fond hope of catching upon their dull torch a gratis wrinkle, press forward in your independent course, rely on your own individual merit, leave those who need to dive into the private formulæ of other people; and when honest endeavour has been crowned with inevitable success, adopt as your own the good old English proverb, "God helps those who help themselves."

31, *Southampton Street, Covent Garden.*

PRACTICAL RULES AND RECIPES IN ELECTRO-DEPOSITION.

BY GEORGE GORE, ESQ.

(*Continued from page* 63.)

126. Iron may be readily deposited in the state of reguline white metal by passing a strong current from a battery of considerable intensity (15 or 20 pairs) for one hour, through an anode of iron immersed in a saturated aqueous solution of sal ammoniac; its appearance when deposited in the reguline state from this liquid is very white, but with an appearance similar to that of freshly broken white cast iron. By the same method it may also be deposited with a saturated solution, either of carbonate of ammonia, acetate of ammonia,

or acetate of potash. I have also obtained fine white metal from a saturated aqueous solution of two parts of protosulphate of iron and one part of sal ammoniac.

127. Mr. J. Napier, in his *Electro-Metallurgy*, states that he has deposited iron from its solution in cyanide of potassium; also that "it may be readily deposited from its sulphate; dissolve a little crystalline sulphate of iron in water, and add a few drops of sulphuric acid to the solution;—one pair of Smee's battery may be used to deposit the iron upon copper or brass. The metal in this pure state has a very bright and beautiful silver colour."

128. A patent was taken out, March 19, 1849, by Messrs. Russell and Woolrich, for the electro-deposition of cadmium, and the following is their description of the process:—"Take cadmium and dissolve it in nitric acid, diluted with five or six times its bulk of water, at a temperature of about 80° or 100° Fah., adding the diluted acid by degrees until the metal is all dissolved. To this solution of cadmium a solution of carbonate of soda (made by dissolving one pound of the ordinary crystals of soda in one gallon of water) is to be added until the cadmium is all precipitated; and the precipitate thus obtained is to be washed four or five times with tepid water; next add as much of a solution of cyanide of potassium as will dissolve the precipitate; after which, one-tenth more of the solution of cyanide of potassium is to be added to form *free* cyanide. The strength of this resulting liquid may vary, but the patentees prefer a solution containing six troy ounces of metal to the gallon. The solution is worked at about 100° Fah., with a plate of cadmium as an anode."

129. Lead may be deposited either from an aqueous solution of nitrate or acetate of lead, or from a solution formed by dissolving oxide of lead in caustic potash.

130. Nickel has been deposited from a solution formed by dissolving the pure metal in nitric acid, then precipitating it either by a solution of caustic potash, carbonate of potash, or cyanide of potassium; washing the precipitate, and dissolving it in a solution of cyanide of potassium, and operating by means of a battery and an anode of pure nickel. Its appearance when deposited from this solution is said to be nearly equal in whiteness to silver, and its deposition has been proposed to be applied to the production of an inferior class of plated articles.

131. I have deposited nickel in the state of reguline white metal from a solution of the double chloride of nickel and ammonia, by making a lump of metallic nickel the anode in a strong aqueous solution of hydrochlorate of ammonia (sal ammoniac), and passing a strong current of electricity through it for several hours, until the liquid acquired a pale greenish-blue colour; also by treating a solution of one part of arseniate of potash and five parts water in a similar manner.

132. Silver has been deposited by the ordinary dipping or wash process, the single cell process, and the battery process. The most common salts of silver are the oxide, chloride, nitrate, and cyanide; the oxide, chloride, and cyanide are sold retail at about seven shillings per ounce, and the nitrate at five shillings per ounce.

133. Oxide of silver is prepared by adding an aqueous solution of caustic potash to a solution of nitrate of silver as long as a brown precipitate occurs. The brown powder, when washed and dried, is oxide of silver; its chemical equivalent is 116.

134. Chloride of silver is formed by adding hydrochloric acid or a solution of common table salt to a solution of nitrate of silver as long as a precipitate takes place; the white precipitate, when washed and dried, is chloride of silver; its chemical equivalent is 143; it should be washed, dried, and preserved out of the influence of light.

135. Nitrate of silver is made by adding pure silver in small quantities at a

time to a warm mixture of four measures of strong nitric and one measure of distilled water; if too much silver is added at a time, or if the heat is too great, the action will be too energetic, and occasion loss of materials; in such a case add a little cold water; when the acid will not dissolve any more silver, the resulting liquid may either be evaporated and crystallized, or it may be kept in the state of solution, protected from light, until required to be used; the chemical equivalent of crystallized nitrate of silver is 170; it is the material from which nearly all the other salts of silver are formed.

136. Acetate of silver is formed by dissolving either the oxide or carbonate of silver in hot and strong acetic acid; or it may be made by adding an aqueous solution of acetate of potash or acetate of soda to a solution of nitrate of silver as long as a precipitate occurs. The precipitated white powder is acetate of silver; it is freely soluble in a solution of cyanide of potassium.

137. Cyanide of silver is prepared by precipitating a solution of nitrate of silver by a solution of cyanide of potassium. The precipitated white powder is cyanide of silver. It is insoluble in water, but is said to be soluble in liquid ammonia, in solutions of carbonate of ammonia, sal ammoniac, nitrate of ammonia, cyanide of ammonia, ferrocyanide of potassium, and hyposulphite of soda. I have found that it is not perceptibly soluble in strong and hot commercial hydrocyanic acid.

138. A French writer, M. Brandely, recommends the following process for preparing very pure and white cyanide of silver:—He makes a solution of nitrate of silver in distilled water, and passes a current of hydrocyanic acid (prussic acid) vapour through it as long as white flocks of cyanide of silver are produced. The gas is formed in a separate glass flask thus:—Mix together six parts of sulphuric acid and from thirty to forty parts of water, and allow the mixture to cool. Put it into the glass vessel, together with ten parts of coarsely powdered ferrocyanide of potassium; connect one end of a bent glass tube with the upper part of the flask, and immerse its other end some distance below the surface of the silver solution; then apply heat to the flask until gas is evolved from the mixture, and continue it as long as the bubbles of gas produce white flocks of cyanide of silver in ascending through the silver solution. The cyanide of silver formed must be washed and dried in the usual manner. This process, although it may yield a purer compound than when the nitrate of silver is precipitated by cyanide of potassium, cannot be very economical, because only half of the cyanogen of the ferrocyanide of potassium passes over as hydrocyanic acid; the remainder remains behind, and is contained in a yellowish-white powder at the bottom of the gas generating vessel.

139. Nearly all the solutions used for electro-silver plating or electro-gilding, contain cyanide of potassium, which is generally made by the following process:—Take ferrocyanide of potassium (yellow prussiate of potash), pound it fine, and gently heat it in an iron pan, with constant stirring, until quite dry. Treat a quantity of the best quality of carbonate of potash in a similar manner. When both are perfectly dry, add about eight parts of the ferrocyanide to three parts of the carbonate, and thoroughly mix them. Put the mixture into an iron ladle or crucible, and heat it until the whole is melted into a clear liquid. Gas will be evolved from its surface. It should be kept at a moderate or dull red heat about fifteen or twenty minutes, or until the end of an iron rod dipped into it a short depth shows a white sample on cooling. The ignition must not be continued until the evolution of gas ceases, otherwise the cyanide obtained will be grey. It should be kept covered as much as possible. By allowing it to stand undisturbed a few minutes at the latter part of the operation, and occasionally gently tapping the sides of the ladle or crucible, the iron of the ferrocyanide will settle at the bottom as a fine black powder, and the colourless cyanide of potassium may then be poured off upon a cold plate

of iron, and be broken up when nearly cold, and kept in a well-closed bottle. The black sediment, which contains some cyanide of potassium, must be scraped out of the vessel whilst still hot, and may be preserved for inferior purposes, as water will at any time dissolve out the cyanide of potassium. If the operation has been well conducted, the cyanide obtained will be of a clear white colour. A greater proportion of cyanide of potassium is obtained by this process from a given weight of materials, than when ferrocyanide alone is employed; because, in the former case, one-third of the cyanogen (that which was combined with the iron) combines with the potassium of the carbonate of potash, whilst in the latter case it is decomposed, and passes off in the form of gas.

140. According to Messrs. Glassford and Napier (*Philosophical Magazine*, 1844), commercial cyanide of potassium often contains as much as fifty per cent. of impurities, but generally about thirty-five per cent. in the form of carbonate and sulphate of potash, chloride of potassium, cyanate of potash, ferrocyanide of potassium, and silica, and if the mixture from which it is made is not dry, salts of ammonia are also formed; the sulphate of potash and chloride of potassium, are derived from the commercial carbonate of potash; the silica occurs when earthen crucibles are used, and even when the materials used are perfectly pure and the operation well conducted, the product contains twenty per cent. of cyanate of potash, partly produced by the contact of the atmosphere with the melted mixture.

141. Commercial cyanide of potassium varies greatly in price as well as in purity; in the United States of America, the best quality of white cyanide is sold retail at from 2*s.* 3*d.* to 2*s.* 6*d.* per pound; in England it varies from 2*s.* 6*d.* to 4*s.* 6*d.* per pound, according to quality; and black cyanide, *i. e.*, cyanide formed by merely melting ferrocyanide of potassium alone, and which contains the particles of iron mixed with it, may be obtained retail at 3*s.* 10*d.* per pound; by dissolving several specimens of commercial black cyanide and filtering the solution, I found the proportion of black impurity in them varied from one-sixth to one-fourth of their weight, and by experiment with the best quality of commercial white cyanide, I found that one part (200 grains) of it dissolved in about one and a quarter parts (230 grains) of distilled water at 60° Fahr., and that it dissolved much more freely in water containing hydrocyanic acid.

142. According to Messrs. Glassford and Napier, the quantity of pure cyanide of potassium in any given sample of the commercial article may be correctly ascertained as follows:—Make two solutions, one of the cyanide to be tested, and one of crystallized nitrate of silver, each containing known quantities by weight of the salts, say three-quarters of an ounce of the cyanide dissolved in five ounces of distilled water in a graduated glass vessel, and 175 grains of the nitrate of silver, dissolved in about two or three ounces of distilled water; add the cyanide solution slowly and carefully to the nitrate of silver, until the precipitate formed is all redissolved; the quantity of the cyanide solution required to effect this (with the above quantity of nitrate of silver) will have contained 130 grains of pure cyanide of potassium, and from the quantity of the solution used, we may easily calculate the amount of pure cyanide contained in the whole three-quarters of an ounce. "When nitrate of silver is added to a solution of cyanide of potassium, so long as the precipitate formed is all redissolved, we obtain the *whole* of the cyanide of potassium in combination with the silver, none of the other salts in solution take any part in the action, even though they be present in a large proportion; this enables us to test the exact quantity of cyanide of potassium in any sample." (Glassford and Napier, *Phil. Mag.*, 1844.)

143. "Cyanide of silver should be dried below 260° Fahr.; it becomes brown by exposure to light; hydrochloric acid decomposes it with evolution of hydrocyanic acid gas; cold nitric acid has no action upon it; a boiling mixture of sulphuric acid and water decomposes it with evolution of hydrocyanic acid gas,

and formation of sulphate of silver; it is soluble in the alkaline chlorides, but its best solvent is an aqueous solution of cyanide of potassium, of which it requires one equivalent (65 parts) to dissolve one equivalent (134 parts); the resulting solution, when evaporated, yields crystals of a double cyanide of silver and potassium, which are soluble in eight parts of cold, and one part of boiling water. The solution of this double salt, which is nearly the same as the ordinary silver plating solution, may be boiled for any length of time without being decomposed, and it is very little affected by light; it is decomposed by all acids; they precipitate the silver as cyanide of silver, the hydracids, hydrochloric acid for example, decompose the cyanide of silver also; sulphuretted hydrogen gas precipitates the silver as sulphide of silver."—(G. and N.)

144. "In the presence of cyanide of potassium, cyanogen has a greater affinity for silver than anything else has, decomposing every salt of silver except the sulphide, and forming cyanide of silver; in dissolving the oxide, carbonate, chloride, or ferrocyanide of silver in a solution of cyanide of potassium, they are all decomposed, and cyanide of silver is always formed."—(G. and N.)

145. The following are recipes taken from various sources for silvering articles by simple immersion or wash process; they are applicable chiefly to small articles, such as pins, buttons, buckles, coffin nails, hooks and eyes, &c., where only a very thin coating of silver is required, and are generally used by adding a small quantity of water sufficient to form the ingredients into a pasty liquid of the consistence of cream, and stirring the articles thoroughly about in it, or rubbing them with it until they acquire the desired whiteness:—1st, Equal parts of chloride of silver and bitartrate of potash; 2nd, Chloride of silver one part, alum two parts, common salt eight parts, and tartar eight parts; 3rd, Chloride of silver one part, prepared chalk one part, common salt one and a quarter parts, and pearlash three parts; 4th, Nitrate of silver one part, and cyanide of potassium three parts; and, 5th, A "novargent" solution for re-silvering old plated goods consists of hyposulphite of soda one hundred parts, and chloride or any other salt of silver fifteen parts. Compounds of this description are also used for silvering clock faces, barometer plates, and various articles formed of copper or brass.

146. Silver may also be deposited by immersing the article to be silvered in a suitable silver solution in contact with a piece of zinc; the patented process of Mr. Joseph Steele, patent dated August 9, 1850, is in accordance with this method. He proceeds as follows:—Dissolve four ounces of pure silver in twenty ounces of warm nitric acid; also dissolve separately one-and-a-half pounds of common table salt in one-and-a-half gallons of water; mix the two solutions together, allow the mixture to remain till clear, pour away the clear liquid, and well wash the precipitated chloride of silver; next fuze together twenty-four ounces of ferrocyanide of potassium and twelve ounces of carbonate of potash, and when cold add it, together with the chloride of silver, to one-and-a-half gallons of water; boil the mixture and filter it; immerse the articles to be silvered in the resulting solution in contact with a piece of zinc of suitable size.

147. A variety of solutions have been proposed and tried for depositing silver by the battery process, but the one which has best stood the test of time and experience is composed of cyanide of silver dissolved in a solution of cyanide of potassium; it may be made of various strengths—from half-an-ounce of silver to the gallon, to four, six, or even ten ounces; and from an ounce of cyanide of potassium, to two, four, or even six pounds, and good deposits of silver be obtained from each; the formula of M. De Ruolz is, dissolve ten parts of cyanide of potassium in one hundred parts of water, add one part of cyanide of silver, and dilute the resulting liquid with a sufficient quantity of water.

148. By the following method a good solution may be made without uncertainty or waste of materials: Take a known quantity by weight of *pure* silver in small pieces, add it by small portions at a time to a mixture of *pure* nitric

acid and *distilled* water in a glass or stoneware vessel (the former is most suitable), placed where the vapours evolved may freely escape; the mixture should be kept warm, and the action maintained moderate and uniform; gas will be freely evolved from the surface of the metal; if the action should become too rapid, a little cold *distilled* water should be added to prevent waste of the materials, or the temperature of the liquid may be lowered; be careful to have rather less of the acid in the first place than will dissolve all the silver, and towards the latter end of the operation after the last portions of silver have been put in the liquid add a little more acid (if necessary), just sufficient to dissolve the remainder of the metal; and, finally, when all is dissolved, apply a greater heat, which will drive off in the state of vapour any little excess of acid which may be present:—next dissolve the salt formed (nitrate of silver) in a large quantity of *distilled* water or clean rain water, say about two or four quarts for every ounce of silver used, also dissolve some cyanide of potassium in clean rain water in a separate vessel, forming a strong solution of about one pound to the gallon, and add it gradually to the solution of silver *just as long* as it causes a white precipitate; if you add too much it will cause some of the precipitate to redissolve and make the liquid transparent where it passes, in such case the liquid should be stirred, then allowed to settle clear, and a solution of nitrate of silver in distilled water should be added to it just as long as it produces a white cloud; by adding the liquid very carefully in small quantities and at intervals of a few minutes each with slight stirring of the liquid immediately after each addition, you will be able to determine the point of neutralization very accurately; allow the liquid to remain undisturbed until quite clear, then pour off the clear part from the precipitate, and fill up the vessel with water; allow it to stand again till clear, and so on successively washing it with water five or six times, when the precipitate may be considered sufficiently washed. If all the materials have been pure and the process throughout properly conducted, the cyanide of silver will have the appearance of a perfectly white powder. Next take a very strong solution of cyanide of potassium in water, and add it gradually to the cyanide of silver with thorough stirring until the whole is dissolved, after that, add a further quantity to form *free* cyanide, then add water until the whole is diluted to the required quantity of silver to the gallon; and, finally, when all is dissolved and mixed, filter the solution through a piece of unglazed calico:—on the *large* scale either clean rain water or spring water is used in place of distilled water for all the operations.

149. The following are the proportions of the several ingredients:—Grain silver, 4 parts; strongest nitric acid (it varies greatly in strength), about 5 parts; distilled water for diluting the acid, about 1 part; commercial cyanide of potassium for precipitating, from 3 to $3\frac{3}{4}$ parts, according to its quality; and free cyanide, from 1 to 3 or 4 parts (best about $2\frac{1}{2}$ or 3 parts). By using these proportions of ingredients, in the manner and with the precautions stated, and diluting the liquid to the required degree, a good solution may be made of any strength, from half an ounce to four or even six ounces of silver to the gallon. In practice the amount of silver to the gallon varies from half an ounce to about four ounces to the gallon, but the ordinary solutions contain about one or two ounces to the gallon. The amount of free cyanide of potassium also varies from half the weight of the silver contained in the solution to ten times this quantity, but an excellent proportion is about three-fourths of the weight of the silver; there is, however, no fixed rule recognized upon this point.

150. If the solution is too strong, *i. e.*, if it contains silver and cyanide of potassium in their proper relative proportions, but has too little water, it conducts very freely, deposits fast, and yields a rich deposit of a fine silky lustre; but it is more difficult to work than a weaker liquid, especially in hot weather, because from the less mobility of its particles it does not keep properly mixed, but is very apt to settle by working into strata of dif-

ferent densities, and become exhausted of silver at its upper part, whilst the lower part becomes nearly saturated with that metal. The consequence is, that the dissolving plates and articles being suspended in the upper part of the liquid, the former waste rapidly, whilst the latter receive very little deposit, and that of a bad quality; sometimes of a grey colour, sometimes brown or yellowish; at other times of a lilac hue, and generally in streaky vertical lines. All these annoyances may be prevented by stirring up the solution thoroughly every night, after having finished plating, or by diluting the solution with water; or, best of all, by both these means combined, together with uniform daily working. All silvering solutions exhibit this tendency to settle into strata, but the weakest ones show it in the least degree. If, on the other hand, the solution is too weak—*i. e.*, if it contains too much water—it conducts sparingly, deposits slowly, and the deposit has a more dead white appearance. This may easily be remedied by adding cyanide of potassium and cyanide of silver to it in proper proportions, and working it uniformly a few days.

151. If the solution is deficient in water, and contains a great excess of *free* cyanide of potassium, the evils mentioned in the early part of the preceding paragraph are all greatly aggravated. In hot weather it becomes altogether unmanageable, and the vapours of hydrocyanic acid and ammonia, arising from it, are quite overpowering. In such a case the best method of improving it is to add cyanide of silver and water, in sufficient quantities to make it of a good composition—keeping it in a cool place, stirring it daily, and working it constantly in an uniform and judicious manner. New solutions, or old ones which have been altered in composition, improve considerably by judicious and uniform working.

152. Every good cyanide of silver and potassium plating liquid requires an occasional addition of cyanide of potassium, probably because it absorbs carbonic acid from the atmosphere, which converts some of the cyanide of potassium into carbonate of potash, and sets hydrocyanic acid gas free, also because a further portion of the cyanide of potassium is decomposed, with formation of ammonia, which also escapes; the necessity of adding a little cyanide of potassium is indicated when the dissolving plate begins to change from its ordinary pure white appearance to a dull yellowish-grey colour. The cyanide is best added in the evening, about half an hour before stirring the solution. An excess of cyanide of potassium is indicated by the dissolving plates being very strongly acted upon, and the deposit at the same time being either very sparing, or of a bad colour.

153. Many electro-platers use a solution containing about half an ounce to one ounce of silver to the gallon, and add a very large proportion of free cyanide to make it conduct freely; such a solution has the advantage of being comparatively inexpensive, quick in working, and yields metal of a fine texture, but it is rather difficult to manage in warm weather, on account of the large proportion of free cyanide.

154. Every good plating solution contains one equivalent (134 parts) of cyanide of silver, and one equivalent (65 parts) of pure cyanide of potassium, besides an additional quantity of cyanide of potassium, equal to half the weight of the silver and upwards, to form *free* cyanide, and sufficient water to form a clear *thin* liquid; the necessity of having *free* cyanide arises from the fact that, in working the solution, cyanide of silver is formed at the dissolving plate, and requires *free* cyanide of potassium to combine with it, and form the double cyanide, at the same time cyanide of potassium and cyanogen are set free at the surface of the articles by the deposition of the silver, and it takes some time for this free cyanide to mix with the liquid and reach the dissolving plate; and the necessity of having sufficient water to form a *thin* liquid arises thus, the double cyanide formed at the dissolving plate has a tendency, from its greater specific

gravity, to sink to the bottom of the liquid, whilst the cyanide of potassium and cyanogen set free at the surface of the articles, tends, from its less specific gravity, to rise to the surface, at the same time each of these substances mixes more or less by diffusion with the surrounding liquid, and the more dilute the liquid is, the more readily does this mixture take place, and this explains why strong solutions require more often stirring than weak ones, to keep them uniform. In some manufactories, where they have a steam-engine, the articles are kept in constant motion by machinery; in other establishments, the solutions are stirred up every evening.

155. If a solution contains much free cyanide, and by any means the battery power becomes suddenly weak towards the latter part of the day, the silver deposited upon the articles will be redissolved off, because the liquid about the dissolving plates having by the day's work become saturated with metal, and that about the articles having become full of free cyanide, the two (*i. e.*, the dissolving plates and the articles) form a kind of voltaic battery, which circulates a current of electricity in an opposite direction to the original one, and thus redissolves the deposited silver.

(*To be continued.*)

CHINESE METHOD OF SCENTING TEA.*

A FEW years ago I sent you an account of the Chinese method of dyeing teas with Prussian blue and gypsum, to suit our depraved tastes in England and America. I shall now endeavour to describe a much more agreeable and rational manufacture—namely, that of scenting teas. That it is so in the eyes of the Chinese, may be gathered from the fact, that while they *dye* their teas not to drink, but only to sell, they consume and appreciate highly these scented teas. The following account of this interesting process is copied from my journal :—

"I have been making inquiries for some time past about the curious process of scenting teas for the foreign markets; but the answers I received to my questions were so unsatisfactory, that I gave up all hopes of understanding the business until I had an opportunity of seeing and judging for myself. During a late visit to Canton, I was informed the process might be seen in full operation in a tea factory on the island of Honan. Messrs. Walkinshaw and Thorburn, two gentlemen well acquainted with the various kinds of teas sent annually to Europe and America, consented to accompany me to this factory, and we took with us the Chinese merchant to whom the place belonged. I was thus placed in a most favourable position for obtaining a correct knowledge of this curious subject. When we entered the tea factory, a strange scene was presented to our view. The place was crowded with women and children, all busily engaged in picking the stalks and yellow or brown leaves out of the black tea. For this labour each was paid at the rate of six cash a catty, and earned on an average about sixty cash a day,—a sum equal to about threepence of our money. The scene altogether was not unlike that in the great Government cigar manufactory at Manilla. Men were employed giving out the tea in its rough state, and in receiving it again when picked. With each portion of tea a wooden ticket was also given, which ticket had to be returned along with the tea. In the northern tea countries, the leaves are carefully weighed when they are given out and when they are brought back, in order to check peculation, which is not unfrequent. I did not observe this precaution taken at Canton. Besides the men who were thus employed, there were many others busily at work, passing the tea through various sized sieves, in order to get out the *caper*, and to separate the various kinds. This was also partly done by a winnowing machine, similar in construction to that used by our farmers in England. Having taken a passing glance at all these objects on entering the building, I next directed my attention to the scenting process, which had been the main object of my visit, and which I shall now endeavour to describe.

"In a corner of the building there lay a large heap of orange flowers, which filled

---

* *Athenæum*, July 21, 1855.

the air with the most delicious perfume. A man was engaged in sifting them, to get out the stamens and other smaller portions of the flower. This process was necessary, in order that the flowers might be readily sifted out of the tea after the scenting had been accomplished. The orange flowers being fully expanded, the large petals were easily separated from the statems and smaller ones. In 100 parts 70 per cent. were used and thirty thrown away. When the orange is used, its flowers must be fully expanded, in order to bring out the scent; but flowers of jasmine may be used in the bud, as they will expand and emit their fragrance during the time they are mixed with the tea. When the flowers had been sifted over in the manner described they were ready for use. In the mean time the tea to be scented had been carefully manipulated, and appeared perfectly dried and finished. At this stage of the process it is worthy of observing, that while the tea was perfectly *dry* the orange flowers were *just as they had been gathered from the trees.* Large quantities of the tea were now mixed up with the flowers, in the proportion of 40lb. of flowers to 100lb. of tea. This *dry* tea and the *undried* flowers were allowed to lie mixed together for the space of twenty-four hours. At the end of this time the flowers were sifted out of the tea, and by the repeated sifting and winnowing processes which the tea had afterwards to undergo they were nearly all got rid of. Sometimes a few stray ones are left in the tea, and may be detected even after it arrives in England. A small portion of tea adheres to the moist flowers when they are sifted out, and this is generally given away to the poor, who pick it out with the hand.

"The flowers, at this part of the process, had impregnated the leaves with a large portion of their peculiar odour, but they had also left behind them a certain portion of moisture, which it was necessary to expel. This was done by placing the tea once more over slow charcoal fires in baskets and sieves prepared for the purpose of drying. The scent communicated by the flowers is very slight for some time, but like the fragrance peculiar to the tea-leaf itself, comes out after being packed for a week or two. Sometimes this scenting process is repeated when the odour is not considered sufficiently strong; and the head man in the factory informed me he sometimes scented twice with orange flowers, and once with the 'Mo-le'—*Jasminum Sambac.*

"The flowers of various plants are used in scenting by the Chinese, some of which are considered better than others, and some can be had at seasons when others are not procurable. I considered it of some importance to the elucidation of this subject to find out not only the Chinese names of these various plants, but also by examining the plants themselves, to be able to give each the name by which it is known to scientific men in all parts of the world. The following list was prepared with great care, and may be fully relied upon. The numbers prefixed express the relative value of each kind in the eyes of the Chinese, and the asterisks point out those which are mostly used for scenting teas for the foreign markets:—

1. Rose, scented (Tsing moi-qui hwa).
1 or 2. Plum, double (Moi hwa).
2*. *Jasminum Sambac* (Mo-le hwa).
2 or 3*. *Jasminum paniculatum* (Sieu-hing-hwa).
4*. *Aglaia odorata* (Lan-hwa, or Yu-chu-lan).
5. *Olea fragrans* (Kwei hwa).
6*. Orange (Chang hwa).
7*. *Gardenia florida* (Pak-sema hwa).

—It has been frequently stated that the *Chloranthus* is largely used. This appears to be a mistake, originating, no doubt, in the similarity of its Chinese name to that of *Aglaia odorata.* The *Chloranthus* is called 'Chu-lan;' the *Aglaia* 'Lan' or 'Yu-chu-lan.'

"The different flowers which I have just named are not all used in the same proportions. Thus, of orange flowers there are 40lb. to 100lb. of tea; of *Aglaia* there are 100lb. to 100lb.; and of *Jasminum Sambac* there are 50lb. to 100lb. The flowers of the Sieu-hing (*Jasminum paniculatum*) are generally mixed with those of the Mo-le (*Jasminum Sambac*) in the proportion of 10lb. of the former to 30lb. of the latter, and the 40lb. thus produced are sufficient for 100lb. of tea. The 'Qui-hwa' (*Olea fragrans*) is used chiefly in the northern districts as a scent for a rare and expensive kind of Hyson Pekoe,—a tea which forms a most delicious and

refreshing beverage when taken *à la Chinoise*, without sugar and milk. The quantity of flowers used seemed to me to be very large; and I made particular inquiries as to whether the teas that are scented were mixed up with large quantities of unscented kinds. The Chinese unhesitatingly affirmed that such was not the case, but notwithstanding their assertions, I confess I have some doubt on this point.

"The length of time which teas thus scented retain the scent is most remarkable. It varies, however, with the different sorts. Thus, the *Olea fragrans* tea will only keep well for one year; at the end of two years it has either become scentless, or has a peculiar oily odour which is disagreeable. Teas scented with Orange blossoms and with those of the Mo-le will keep well for two or three years, and the Sieu-hing kinds for three or four years. The *Aglaia* retains the scent longer than any, and is said to preserve well for five or six years. The tea scented with the Sieu-hing is said to be most esteemed by foreigners, although it is put down as second or third rate by the Chinese.

"Scented teas for the foreign markets are nearly all made in Canton, and are known to merchants by the names of 'Scented Orange Pekoe,' and 'Scented Caper.' They are grown in and near a place called Tai-shan, in the Canton Province. Mr. Walkinshaw informs me that other descriptions of tea, both black and green, have been scented for the English market, but have been found unsuitable. True 'caper' is to black tea what the kinds called 'imperial' and 'gunpowder' are to green: it assumes a round, shot-looking form during the process of manipulation, and it is easily separated from the other leaves by sifting or by the winnowing machine. It is a common error to suppose that 'imperial' or 'gunpowder' amongst green teas, or 'caper' amongst black ones, is prepared by rolling each leaf singly by the hand. Such a method of manipulation would make them much more expensive than they are. One gathering of tea is said to yield seventy per cent. of orange pekoe, twenty-five of souchong, and five of caper. The quantity of true caper would therefore appear to be very small; but there are many ways of increasing the quantity by peculiar modes of manipulation.

"In a large factory, such as this at Canton, there is, of course, a considerable quantity of dust and refuse tea remaining after the orange pekoe, caper, and souchong have been sifted out of it. This is sold in the country to the natives at a low price, and no doubt is often made up with paste and other ingredients into those *lie teas* which now-a-days find a market in England. Nothing is lost or thrown away in China. The stalks and yellow leaves which have been picked out by women and children are sold in the country; while the flowers which have done their duty in the scenting process are given to the poor, who pick out the few remaining tea leaves which had been left by the sieve or winnowing machine. Some flowers, such as those of the *Aglaia* for example, after being sifted out from the tea, are dried and used in the manufacture of the fragrant 'jos stick,' so much used in the religious ceremonies of the country.

"It appears from these investigations that many kinds of fragrant flowers, besides those used by the Chinese, would answer the purpose equally well, and therefore in places like India, where tea is likely to be produced upon an extensive scale, experiments in scenting might be made with any kinds of jasmines, daphnes, aurantiaceous or other fragrant plants indigenous to the country. R. F."

Shanghae, May 2.

AUSTRALIAN MEDICINAL PLANTS.

Dr. Ferdinand Müller, Government Botanist to the Colony of Victoria, Australia, has addressed to the Colonial Secretary his first General Report on the Vegetation of the Colony, under date Melbourne, Sept. 5, 1853. In this report, which, in conjunction with other documents relating to Australia, has recently been printed and presented to Parliament,* the author thus refers to the plants of that country, which, in his opinion, are likely to prove useful in medicine:—

---

* *Further Papers relative to the Discovery of Gold in Australia, presented to both Houses of Parliament, by Command of Her Majesty, December*, 1854. London: Eyre and Spottiswoode. 1855.

The inestimable truth, that we may safely deduct the closest affinities of the medicinal properties of plants from their natural alliances—a truth which achieved the most complete triumph of the natural system over all artificial classifications—has generally guided me in tracing out which plants might be administered in medicine. By this guidance I observed that our *Pimeleæ* are pervaded by that acridity for which the bark of *Daphne Mezereum* is employed; that our *Polygala veronicea*, F. Müll., the only described Australian species of a large genus, and in close relation to one lately discovered in the Chinese empire, not only agrees, like some kinds of *Comesperma*, with the Austrian *Polygala amara*, in those qualities for which that plant has been administered in consumption, but also participates in the medicinal virtue of *Polygala Senega* from North America. *Gratiola latifolia*, R. Br. and *G. pubescens*, R. Br., *Convolvulus erubescens* Sims, and the various kinds of *Mentha* are not inferior to similar European species. The bark of *Tasmania aromatica*, R. Br., appears to me to possess the medicinal power of Winter's bark, gathered from a similar tree in Tierra del Fuego; and its fruit is allied to that of the North American *Magnoliæ* used in cases of rheumatism and intermittent fever. The whole natural order of *Goodeniaceæ*, with the exception perhaps of a few species, contains a tonic bitterness never recognized before, and discernible in many plants in so high a degree, that I was induced for this reason to bestow upon a new genus from the interior the name of *Picrophyta:* this property, which indicates a certain alliance to *Gentianeæ*, deserves the more consideration, as the true gentians are so sparingly distributed through Australia, while the *Goodeniaceæ* form everywhere here a prominent feature in the vegetation. Our Alps, however, enrich us also with a thick-rooted gentian (*G. Diemensis*, Griesebach), certainly as valuable as the officinal *Gentiana lutea;* and in the spring *Sabæa ovata*, R. Br., and *S. albidiflora*, F. Müll., and *Erythræa Australis*, R. Br., might also be collected on account of their bitterness. The bark of the Australian sassafras tree (*Atherospermum moschatum*, Forst.) has already obtained some celebrity as a substitute for tea. Administered in a greater degree of concentration it is diaphoretic as well as diuretic, and has for this reason already been practically introduced into medicine by one of our eminent physicians. *Isotoma axillaris*, Lindl., surpasses all other indigenous *Lobeliaceæ* in its intense acridity, and can be therefore only cautiously employed instead of *Lobelia inflata.* The root of *Malva Behriana*, Schlect., scarcely differs from that of *Althæa officinalis*, and the salep root might be collected from many *Orchideæ*. Few may be aware that the Cajeput Oil of India is obtained from trees very similar to our common *Melaleucæ;* and that even from the leaves of the *Eucalypti* an oil can be procured of equal utility. The Sandarac, exuding from the *Callitris*, or pine tree, the balsamic resin of the grass trees, and, moreover, the *Eucalyptus* gum, which could be gathered in boundless quantities, and which for its astringent qualities might, here at least, supersede the use of kino or catechu, will probably at a future period form articles of export.

Several *Acaciæ* are of essential service, either for their durable wood or for the abundance of tannin in their bark, which has rendered them already useful, or for their gum; but the latter is even excelled in clearness and solubility by that obtained from *Pittosporum acacioides*, A. Cunningh. This species, as well as many other plants of the same order, is distinguished by a surprising yet apparently harmless bitterness—a quality that warrants our expecting considerable medicinal power, and which deserves so much more attention, as till now we know nothing of the usefulness of the *Pittosporeæ*, although this order extends over a great part of the eastern hemisphere.

The Australian manna consists in a saccharine secretion, condensed chiefly by the cicades from a few species of *Eucalyptus*, but is chemically very differently constituted to the *Ornus* manna, and much less aperient. All our splendid *Diosmeæ*—a real ornament to the country—approach more or less in their medicinal effect to the South African Bucco-bushes.

Baeckea utilis, F. Müll., from Mount Aberdeen, might serve travellers in those desolate localities as tea, for the volatile oil of its leaves resembles greatly in taste and odour that of lemons, not without a pleasant, peculiar aroma. *Trigonella suavissima*, Lindl., proved valuable as an antiscorbutic spinach in Sir Thomas Mitchell's expedition; and the *Tetragonella implexicoma*, Miquel, the various *Cardamines*, *Nasturtium terrestre*, R. Br., or *Lawrencia spicata*, Hook., may likewise be used for the same purpose. The root of *Scorzonera Lawrencii*, Hook., a favourite

food of the natives, would form, if enlarged by culture, an agreeable substitute for *Scorzonera Hispanica*, or asparagus ; and *Anisotome glacialis*, F. Müll., a large-rooted umbelliferous plant from the snowy top of Mount Buller, will be added hereafter, perhaps, to the culinary vegetables of the colder climates. Seeds of the latter plants, amongst many others, have been procured for the Botanic Gardens. *Santalum lanceolatum*, R. Br., *Mesembryanthemum æquilaterale*, Haw., *Leptomeria pungens*, F. Müll., and *L. acerba*, F. Müll., deserve notice for their agreeable fruit.

ON THE EXTRACTION OF CAOUCHOUC.

BY M. WEDDELL.

Caouchouc may be obtained from a great many plants, but those which yield it in any abundance are comparatively few in number. They belong to the natural orders Artocarpeæ, Apocynaceæ, and Euphorbiaceæ, and inhabit all the warmest parts of the earth.

In *Artocarpeæ* we have,

Castillea elastica (Cerv.) of Mexico,

Cecropia peltata (Linn.) of Tropical America,

And various fig-trees of Asia and America, of which, however, Ficus elastica is the only important one, being the principal source of caouchouc in the East Indies.

In *Apocynaceæ* there is,

Urceola elastica (Roxb.) which furnishes the Borneo and Sumatra Indian-rubber, known in commerce as Singapore or Pulo-Penang India-rubber ;

Vahea gummifera (Poir.), the source of Madagascar Indian-rubber ; and Hancomia spinosa (Gomez.), from which I saw a large quantity collected in the interior of the Brazils.

Belonging to *Euphorbiaceæ* we have the well-known Siphonia elastica, or Hevea guyanensis, which yields the largest amount of commercial caouchouc, known in commerce as Para Indian-rubber, from its being imported from Para, a small port situated at the mouth of the Amazon river.

This tree, which grows extensively on the plains of the Oronoco and Amazon rivers, will be the one to which my remarks will be exclusively confined. Siphonia elastica, or the Syringe-tree* of the Brazils, generally averages sixty-five to sixty-seven feet in height, frequently reaching forty to fifty feet before a single branch is given off. The diameter varies from thirty to forty inches.

These dimensions, however, are frequently met with in trees which inhabit the tropical forests, but the peculiarity of its foliage, each leaf being composed of three elongated leaflets, together with the abundance of milky juice it yields upon incision, easily distinguishes this tree from all others growing around it.

Nothing could be easier than the method of collecting and preparing caouchouc. The workman goes early in the morning into the forest, provided with a hatchet, a calabash, and a quantity of soft clay. Arriving at the foot of a Siphonia, he fastens round its base, by means of the clay, a small glazed dish, resembling in shape a swallow's nest, and with his hatchet severs the bark immediately above the dish. The milky sap immediately exudes, and is collected in the dish below. When a sufficient number of trees have been treated in this way, the workman collects the contents of the little dishes in his calabash and returns home with his booty.

The quantity of sap yielded by one tree naturally varies, but on an average, twenty trees yield two pints ; and, when well managed, the same trees will yield daily the same quantity during a period of some months.

A traveller tells me, that being on the borders of the Amazon river, he stopped a

---

* The origin of this name is given in *L'Histoire de l'Académie Royale des Sciences*, 1751, page 18, in the following terms :—

"The Omaquas, a tribe inhabiting the borders of the Amazon river, make an extraordinary use of this exudation. They form it into pear-shaped bottles or bulbs, in the neck of which they fasten a hollow wooden tube ; upon filling the bulb with water, and then pressing it with the hand, the water is forced out at the mouth of the tube, forming in this way a complete syringe. It is considered by these people an ordinary mark of politeness for a host to present to each of his guests one of these bottles filled with warm water, and which they do not fail to make use of before setting down to dinner. This strange custom has led the Portuguese to name the tree which produces this resin, *Pas de xiringa*, or syringe wood."

day in the cottage of a caouchouc collector, and about mid-day he saw his host returning with a calabash, which contained eight pints of siphonia milk, a quantity sufficient for the manufacture of ten pairs of shoes. His daughters, who were less practised than himself, had during the same period collected four pints, which is the average quantity for one workman. I have mentioned shoes, because in that form, or as round and egg-shaped bottles, tubes, and sheets, the larger quantity of Indian-rubber is still exported from the Brazils. The bottles are made by dipping a ball of clay, fastened to the end of a stick, into the fresh juice, and immediately afterwards holding it in a thick smoke, produced by the combustion of oleaginous seeds. When the first layer has partially solidified, others are applied in the same manner till a sufficient thickness has been obtained. Shoes are made in the same manner, with the exception that a wooden mould, thinly coated with clay, is employed—as it admits of being withdrawn without breaking. Ten minutes is generally sufficient for a clever workman to make a pair of shoes. I must mention, however, that the effect of the smoke is to coagulate the caouchouc. The hardening is afterwards effected by exposure for some time to the sun.

Some experiments have recently been made with a view to the exportation of this substance in the liquid state, by inclosing it in hermetically sealed bottles. Upon opening these bottles, however, a solid mass of caouchouc floating in a serous liquid, presents itself. If the milky sap, as first extracted, be allowed to stand for some time, it separates into two portions in the same manner as milk ; a substance which it closely resembles in appearance and taste. It may also be drank without any injurious effects being produced.

The most favourable period for extracting caouchouc is the summer season, from April to November. During the wet weather the work in the forest is very difficult and unhealthy. The product also is very inferior, containing much less of its solid coagulable constituents. During the collecting season the trees have to be wounded afresh every day ; it therefore becomes necessary to make the first incisions as low down as possible, because also, the old wounds in healing frequently form a sort of swelling round the part which would absorb a portion of the descending sap.

The quality of these trees varies greatly, some yielding more than others; generally, however, the more sap there has been abstracted, the more the tree seems capable of yielding. In this respect these trees resemble good cows.

The preceding facts will be sufficient to prove that the method adopted by the Africans, Indians, and South Americans for obtaining caouchouc, is at once simple and efficacious. Every fact in the history of this substance is calculated to stimulate the activity of an intelligent explorer, and assures us of the future prosperity of one of the most interesting branches of American commerce.

NOTE ON THE INDIA-RUBBER OF THE AMAZON.

BY R. SPRUCE, ESQ.*

The extraction of caouchouc from the various species of *Siphonia* was, at the time of my arrival in Pará (July, 1849), a branch of industry limited to the immediate environs of that city, being carried on principally in the island of Marajó, and about the mouth of the Tocantins. The low price it fetched in the Pará market (10 milreis—£1 3*s*. 4*d*. the *arroba* of 32lbs.), and the great gains which those who trade in the *sertão* † expect on their outlay, prevented the *sertanejos* from employing themselves in the fabrication of *seringa* ; ‡ to which contributed also the universal apathy and even antipathy to everything new, if it involved labour, no matter how profitable. When I ascended the Rio Negro in 1851, I pointed out to the inhabitants

---

* *Hooker's Journal of Botany and Kew Gardens Miscellany*, July, 1855, p. 193.

† The Interior,—literally, "the desert."

‡ The name usually given to India-rubber on the Amazon is "Xeringue" (pronounced nearly *Sheringhy*). This is undoubtedly an Indian corruption of the Portuguese word "Seringa," a syringe or clyster-pipe, the fabrication of which was the first use to which the gum of the *Siphonia* was applied in its native country. In Lingoa Geral, *xeringue* is the common term for a liar (query, *a stretcher?*), but, as it has no affinity with any other word in the same language, it seems certain that it is of Portuguese origin. The Spaniards have adopted the term "Seringa," in which I follow them. The Indians of Venezuela call the rubber *yâpi dâpi*, or *dâpiche*.

the abundance of *seringa*-trees they possessed in their forests, and tried to induce them to set about extracting the gum; but they shook their heads, and said it would never answer. At length the demand for India-rubber, especially from the United States, began to exceed the supply; the price consequently rose rapidly, until early in 1854 it reached the extravagant sum of 38 milreis (£4 8*s*. 8*d*.) the arroba. This woke up the people from their apathy, and the impulse, once given, extended so rapidly and widely, that nearly throughout the Amazon and its principal tributaries, the mass of the population put itself into motion to search out and fabricate *seringa*. In the province of Pará alone (which now includes a very small portion of the Amazon) it was computed that 25,000 persons were employed in that branch of industry in the year 1854. Mechanics threw aside their tools, sugar-makers deserted their *engenhos*, and Indians their *roças;* so that sugar, rum, and even *farinha*, were not produced in sufficient quantity for the consumption of the province, the two former articles having to be imported from Maranham and Pernambuco, and the last from the river Uaupés.

The mode of obtaining the milk is almost universally by tapping. Some who began by cutting down the trees, found that in this way they obtained much less milk than by successive tappings of the same tree, besides that the work was harder, and it was necessary continually to shift their sphere of operations. I am glad, therefore, that this killing of the hen to get at the golden eggs has been abandoned.

Most *seringueiros* follow the old mode by drying the milk by smoke, applied to successive coatings on a mould. Some have filled a small square box with the milk, and allowed it to coagulate; but, as the milk does not become solid until the end of ten days or more, and the mass then requires to be cut into thin slices, and subjected to heavy pressure (such as it is difficult to obtain here), in order to free it from the water and air collected in cells within its substance, this mode is by no means popular.

It is found that the addition of a small quantity of alum accelerates the coagulation of the milk. Ammonia has a contrary effect, and is accordingly useful when the milk is required to be kept some time in a liquid state.

When the trees are flowering, nearly all the milk goes to the nourishment of the flowers, and scarcely any can be obtained from the trunk, while if a panicle be wounded the milk starts out in large drops. It is customary to leave the trees untouched for a few months in the year, from the epoch of flowering until the fruit has attained its full size. About Pará, the collection of *seringa* seems limited to the dry season—June to December. On the upper Rio Negro, the *seringa*-trees flower from November to the end of January; and when I started from San Carlos on November 23rd, little milk was to be obtained.

The species from which rubber is extracted on the upper Rio Negro and lower Casiquiare are two, *Siphonia lutea*, Spruce (*Journ. of Bot.*, vi., 370), and *S. brevifolia*, Spruce (3139 to Bentham); known respectively as the *long-leaved* and *short-leaved seringa*. The former yields most milk, but neither is so productive as the *seringa* of Pará (*Siphonia Brasiliensis*, Willd.). Both are straight, tall, and not very thick trees, with smoothish thin bark, and yellow very odoriferous flowers, while the other species have mostly purplish flowers. I suppose their average height may be about 100 feet. I cut down a tree of *S. brevifolia* near San Carlos which measured 110 feet. I first saw and gathered *S. lutea* in the mouth of the Uaupés; and as I came down the Rio Negro in December, 1854, I found a *rancho* erected on the spot, and a person employed in extracting rubber from the same trees as I had taken the flowers.

Near the Barra, some milk is taken from a *Siphonia* common on the river-banks (*S. elastica*, Aubl.?); but there is another species growing in the interior of the forest said to yield more milk. I have not seen it, and cannot say whether it is a species known to me.

The *Siphonia* most frequent about the mouths of the Tapajoz and Madeira seems to be *S. Spruceana*, Benth., but there are, no doubt, other species.

I have gathered, in all, some seven or eight species of *Siphonia* on the Amazon and Rio Negro, but it is probable that two or three times as many still remain to be discovered.

On the Uaupés, I met with two trees* of a genus apparently far removed from

* No. 2427 and 2479 to Bentham.

Siphonia,—possibly they are *Sapotaceæ*, for I did not analyse the flower (*Micrandra*, Benth. in *Journ. of Bot.*, vi., 371)—which yield pure rubber, and are also called by the Indians *Xeringue;* but the clustered trunks (often as many as ten from a root) and the simple (not ternate) leaves, give these trees an aspect very different from that of the *Siphoniæ*.

There are, doubtless, several other trees in the valley of the Amazon which yield rubber, but in many cases mixed with resin, which we have not here the means of separating. Such are a great many Figs and Artocarps, two families which abound towards the head-waters of the Rio Negro and Oronoco. On the Casiquiare, the Indians make white shirts of the bark of an epiphytal fig, which they call *marima blanca*, the milk of which is said to be very copious, and when dry elastic. Towards the upper mouth of the Casiquiare I saw several trees of *marima blanca*, but they were perched high up on other trees, and had no flowers or fruit. Those who have herborized among mosquitoes, ants, and wasps, will understand why I did not trouble myself to gather only a sterile branch.

In descending the Casiquiare, in January, 1853, I reached one evening a small village some distance above the outlet of Lake Vasiva—one of those *pueblos* which spring up on the banks of the Rio Negro and Casiquiare, endure barely a generation, and then disappear—where I found nearly the whole population (Indians of the tribe Pacimonare) amusing themselves by a sort of football. Their balls seemed to be the inflated bladders of some large quadruped, such as the tapir; but on picking one up I found it to be India-rubber. I asked them to keep two or three balls for me when they had finished their game, and they promised to do so, but during the night they all got gloriously drunk and burst their balls. I did not see the tree from which this rubber was extracted, but from the description given me it was a true *Siphonia*, perhaps *S. lutea*.

In consequence of so many people devoting themselves to the fabrication of *seringa*, the value fell again more rapidly than it had risen, and by last advices from Pará to date of February 1, 1855, *seringa* was down at 15 to 18 milreis the arroba.

RICHARD SPRUCE.

Barra do Rio Negro, Feb. 9th, 1855.

DETECTION OF A CRUCIFEROUS OIL, WHEN MIXED WITH ANY OTHER FRUIT OR SEED OIL.

BY M. MAILHO.

THE difficulty of distinguishing the different fatty oils of commerce, in a state of mixture, has been the subject of various researches for a length of time, and yet the indicated tests do not always lead to an easy detection; especially when the mixture is the result of fraud, and the inferior oils added are in such proportion as to preserve to the adulterated article all its original physical characters. In such case Lefebre's oleometer, which is usually used in commerce, does not indicate the true nature of the oil; and even when it indicates fraud, it cannot tell us what oil has been added. For olive oil the nitrate of mercury test, proposed by Poutet, and the hyponitric acid of M. Felix Boudet are sufficiently accurate reagents. Oils used for burning find in chlorine (as proposed by M. Fauré) a delicate test for indicating the presence of an animal oil, but no method has yet been published for indicating the presence of a cruciferous oil in other fatty oils, such as linseed, nut, or olive oil.

Having been called upon to examine a certain quantity of linseed oil, in order to decide a dispute between buyer and seller, I subjected the oil to the different reagents as indicated by those Chemists who have principally studied this branch of analysis, and although they proved to me that the oil could not be pure, I was at a loss to specify the adulteration. After many futile experiments, I found in saponification the means of detecting the nature of the fraudulent admixture. When acted upon by a caustic alkali the oil deposited a small portion of sulphur, which blackened immediately the silver basin which I used in the operation. This circumstance caused me at once to suspect that the oil used for adulteration was derived from a cruciferous seed. I treated all the commercial fatty oils with a solution of pure caustic potash, and I had the satisfaction to see, that all the cruciferous oils yielded a quantity of sulphur, which in the state of alkaline sulphuret formed in the process, was quite sufficient to be detected by the usual reagents—as lead or silver,

salts, &c. All the other oils, as linseed, poppy, nut oil, could be treated in the same way without any indication of the presence of sulphur.

I propose, therefore, the following as a test for an oil of the cruciferæ—such as colza, rape, mustard, &c., in other oils. Twenty-five to thirty grammes (seven to eight drachms) of the suspected oil are boiled in a porcelain basin, with a solution of thirty grains of pure caustic potash in five drachms of distilled water. After an ebullition of a few minutes the whole is filtered, and the filtrate, when tested with nitrate of silver or acetate of lead paper, will speedily indicate the presence of sulphur.

If, instead of a porcelain capsule, the oil is saponified in a silver vessel, the blackening of the latter speedily becomes visible. This test is very prompt and delicate, indicating the presence of one hundredth part of a cruciferous oil in any other oil.—*Comptes Rendus.*

METHOD OF DECOLOURIZING TANNIN.

F. Kümmell* states that a solution of tannin in mixed alcohol and ether may be decolourized by animal charcoal. In preparing tannin by percolation, he places a layer of recently ignited animal charcoal immediately above the cotton wool plug. The product thus obtained has scarcely any yellow colour, and the solution in water, ether, or alcohol, is almost colourless. Animal charcoal cannot be used when the tannin is extracted by ether alone, on account of the viscid character of the solution. Attempts to decolourize an aqueous solution of tannin by animal charcoal did not give a favourable result.

BLACK STAIN FOR WOOD.

BY C. KARMARSCH.

The author having learnt from Professor Altmüller, of Vienna, that Runge's black stain, which has been much recommended for some years as an ink for steel pens, furnished an excellent means of staining wood black, was induced to make some experiments, the results of which lead him to recommend it further for this purpose.

The ink in question, which may be readily prepared by any one, is applied to the wood without warming, or any other preparation, by means of a brush or sponge. When dry, the application of the dye is repeated, and three, or at the utmost four, applications produce a deep black colour, which acquires the highest beauty when polished or varnished.

The stain may be kept for a long time ; and in simplicity of employment, as well as in the goodness and rapidity of its results, it exceeds the common black wood stain, which it certainly equals in cheapness. The author has obtained equally good results with the most different woods, such as beech, cherry, poplar, lime, fir, &c.

The best method for the preparation of the chrome-ink, according to several comparative experiments, is the following :—Four pounds or two quarts of boiling water are poured over one ounce of pounded commercial extract of logwood, and when the solution is effected, one drachm of yellow chromate of potash is added, and the whole well stirred. The fluid is then ready for use as a writing ink or wood-stain. It has a beautiful violet-blue colour, as may be seen from the thin stratum which runs down the glass when the bottle is shaken, but when rubbed upon wood it produces a pure black. It may be prepared, even on a small scale, at the price of threepence per quart.

When the extract of logwood cannot be obtained, the preparation is rather more tedious. In this case, four pounds of logwood may be extracted by boiling with water for about an hour, and the fluid, separated by decantation and pressing the woody residue, evaporated to about three quarts; one drachm of chromate of potash is then dissolved in it. The author has obtained remarkably good results in staining wood with a fluid prepared in this manner ; but when it stands for a time, it deposits a considerable quantity of black sediment, which shows that it might have more water. Indeed, Runge recommends a larger quantity both of water and chromate

* *Archiv. der Pharmacie*, April, 1855.

of potash for the preparation of his chromic ink. According to his receipt, 1000 parts of decoction are to be prepared from 125 parts of logwood, and to this one part of chromate of potash is to be added. Perhaps, a proportion lying midway between this and the preceding recipe might be the most advisable for a wood-stain—namely, four pounds of logwood to yield nine quarts of decoction, to which half an ounce of chromate of potash may be added.

The commercial extract is however to be preferred, as with it the preparation is made very quickly, and with little trouble.—*Mittheil, des Gewerbevereins für Hannover*, 1854, p. 298, and *Chemical Gazette*.

PURIFICATION OF HONEY.

The substances that have hitherto been employed for clarifying honey, are paper-paste, charcoal, albumen, and tannin. The first three must act mechanically. A. Hofmann,* however, is of opinion that tannin acts chemically by precipitating the gelatine present in greater or less quantity in raw honey. The precipitate thus formed envelopes and separates the suspended substances.

Sometimes honey cannot be purified by tannin, owing to a deficiency of gelatine, and for this reason the author recommends the addition of gelatine previous to the clarification of the honey. For this purpose, the honey (28 pounds) is dissolved in twice its weight of water, and heated to boiling. A solution of gelatine (3 drachms) in three times its weight of water is then added, and, lastly, a solution of tannin (1 drachm) in water, or an infusion of two drachms of powdered galls. The mixture is well stirred and kept hot for about an hour. About seven-eighths of the honey may be drawn off clear, the remainder is filtered through flannel, and the clear solution evaporated.

METHODS OF ANALYTICAL SEPARATION AND QUANTITATIVE ESTIMATION.

1. *Separation of Phosphoric Acid from Bases.*†—In order to separate phosphoric acid from alkalies, alkaline earths, the nitric solution of the substance is mixed with a known quantity of nitrate of iron in such proportion that the base amounts to rather more than is sufficient for the formation of phosphate of iron ($Fe_2 O_3 PO_5$), then evaporated to dryness, and the residue heated so long as nitric vapour is given off. The whole of the phosphoric acid remains in combination with oxide of iron while the other bases are in the state of nitrates, and may be dissolved out by water.

Treatment in a similar manner with nitrate of alumina is equally efficacious for the separation of phosphoric acid from these bases, but there are practical advantages in the use of nitrate of iron for this purpose.

Phosphoric acid may in this way be separated very readily and completely from alkalies and alkaline earths, with exception of magnesia, the nitrate of which loses a part of its acid between 464° Fah. and 480° Fah., and at a much lower temperature when heated with phosphoric acid and oxide of iron, so that when this base is present it is not safe to heat the nitrate residue beyond 320° Fah.

When the substance in which phosphoric acid is to be estimated contains iron or aluminum, and in sufficient quantity for the separation of the phosphoric acid by this method, the bases are at once separated into two groups—alkalies and alkaline earths, are separated in solution, while alumina, metallic oxides, and phosphoric acid remain in the insoluble residue. The phosphoric acid is separated from this residue by fusion with alkaline carbonate, and silica.‡

It is essential to the success of this method that no other strong acids should be present, and sulphuric acid should be separated, prior to the evaporation, by a nitrate of baryta solution of known value; chlorine in like manner by a nitrate of silver solution. In the case of chlorine the separation may be effected without introducing any excess of the precipitant, but in the case of sulphuric acid this is not so easy. If, however, an excess of baryta has been added, its amount q may be ascertained

* *Vierteljahrschrift für Prakt. Pharmacie.*

† J. Weeren, *Annalen der Physik und Chemie*, July, 1855.

‡ H. Rose, *Handbuch der Analytischen Chemie*, bd. ii., p. 534.

by deducting from the quantity Q of baryta added, the quantity q in the sulphate of baryta obtained.

2. *Separation of Alumina from Oxide of Iron.*—The insufficiency of the usual methods of separating alumina from oxide of iron is principally owing to the modifying influence exercised by certain organic substances, such as tartaric acid, upon the behaviour of all the weaker metallic bases with most reagents except sulphides. Since, however, the metals which are precipitated as sulphides by sulphide of hydrogen only from alkaline solutions, are precipitated by sulphide of ammonium as sulphides and not as oxides, while on the contrary the metals which do not form soluble double salts with ammonia, are precipitated by the same reagent only as hydrates, the two facts may be taken advantage of for the direct estimation of alumina.

Thus, when a solution containing iron and aluminum with tartaric acid sufficient to prevent their precipitation as oxides by ammonia, is mixed with excess of ammonia and then with sulphide of ammonium, the whole of the iron is precipitated as sulphide, and the whole of the alumina remains in solution.

The separation of the sulphide of iron in the presence of organic substance is attended with some difficulty, but may be effected in the following manner:—

The precipitation is made in a flask furnished with a glass stopper; after adding a sufficient excess of sulphide of ammonium, the flask is filled to within a few cubic centimeters with hot water, the contents well shaken, and then set in a warm place. When the precipitate has perfectly subsided the stopper is replaced by a cork with two vertical holes, through one of which fits the shorter limb of a syphon tube reaching nearly to the sulphide precipitate. In the other hole is a rectangular tube by which the flask may be connected with a sulphide of hydrogen generator, and by slowly passing this gas into the flask the clear liquid is forced through the syphon. Water containing some sulphide of ammonium is then added, and the washing repeated in the same manner; and, lastly, the sulphide of iron collected upon a filter dissolved by hydrochloric acid, together with any particles adhering to the flask, and estimated in the usual manner.

The filtrate is evaporated to dryness, the residue heated gradually until the tartaric acid is perfectly charred, boiled with strong hydrochloric acid, and the alumina precipitated by ammonia.

3. *Estimation of Carbon.*—Brunner* describes a new method of estimating carbon, which would in many instances be preferable to the usual one of combustion. It is based upon the reaction between carbon and chromic acid, by which it is converted into carbonic acid, even in the state of graphite or diamond, and when in combination likewise.

It was found that when a sufficient excess of chromic acid is used there is no danger of the formation of formic acid or other carbonaceous substances, as in the experiment of Piria, Guckelberger, Scheele, and Dobereiner.

Experiments were made with salicin, sugar, and wood shavings, in the following proportions :—

1 grm. salicin	1 grm. sugar	0.3 grm. dry wood shavings
10 grm. bichrom. potash	10 grm. bichrom. potash	7 grm. bichrom. potash
10 cub. cent. sulph. acid	10 cub. cent. sulph. acid	10 cub. cent. sulph. acid
10 cub. cent. water	10 cub. cent. water	10 cub. cent. water

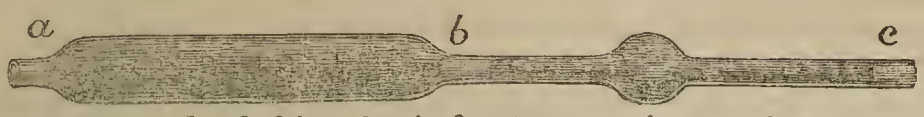
and in each the carbon was perfectly converted into carbonic acid.

The proportion of water requisite, depends upon the solubility of the substance analysed, and its more or less ready decomposition. Coal and charcoal require concentrated acid; sugar, gum, organic acids, &c., require the presence of a considerable amount of water to prevent too violent reaction.

The apparatus used for the experiment consists of a small tubulated retort, supported in such a manner that the liquid condensed in the neck may run back again. The tubulure is fitted by means of a bored cork with a rectangular tube, one end of which dips into the contents of the retort, while the other is contracted and sealed. The mouth of the retort is connected by a caouchouc collar with a glass tube three feet long, and bent at the middle, so that while one-half is horizontal, the other has the same inclination as the retort neck. The horizontal portion of this

* *Annalen der Physik und Chemie*, July, 1855, p. 379.

tube is filled with pumice-stone saturated with sulphuric acid, and is connected with a tube for absorbing the carbonic acid.



The wider portion, *a b*, of this tube, is fourteen centimeters long, two centimeters wide, and contains caustic lime slacked with caustic potash. The narrow portion, *b c*, contains pumice, saturated with sulphuric acid, and at *a b* and *c* are loose plugs of cotton wool. A tube of this size is capable of absorbing from 1 to 1.5 grm. of carbonic acid with perfect certainty.

The dried substance mixed with the requisite amount of bichromate of potash is introduced into the retort, the cold mixture of sulphuric acid and water poured in, and the tubulure closed. Most substances are acted upon at once at the ordinary temperature, otherwise a gentle heat is applied, the reaction regulated, and, lastly, the contents of the retort made to boil for five or ten minutes. The point of the tube in the retort is then broken off, and a current of air drawn through the apparatus.

In the analysis of cast iron there is difficulty in dissolving the iron without loss of carbon as carburetted hydrogen. If again the solution is effected by substances which do not cause evolution of gas, such as sulphurous acid, chloride of silver and water, &c., the carbon left is impure. It is on this account that the process of oxidation has recently been adopted after the proposition of Regnault and Kudernatsch.

When a sufficient excess of bichromate of potash and sulphuric acid is employed, the iron is dissolved without any evolution of hydrogen, which takes place only when all the chromic acid is reduced to oxide, and then it may be stopped by adding more bichromate. There remains after this treatment a carbonaceous substance, having the appearance of graphite, which does not experience any further alteration in the liquid by which the iron was dissolved, although it is dissolved by a more concentrated mixture of sulphuric acid and bichromate, with exception of a small earthy residue. The operation must, therefore, be twofold. The best proportions for the solution of the iron, are, for 2 grms. of metal, 12 grms. of bichromate, 9 cub. cent. of sulphuric acid, and 60 cub. cent. of water. When the solution is completed, the liquid is poured into a cylindrical glass, and the carbonaceous residue again transferred to the retort, mixed with 5 grms. of bichromate, 15 cub. cent. sulphuric acid, and 2 cub. cent. water. This last treatment suffices to convert the whole of the residual carbon into carbonic acid.

This method was likewise found applicable to the estimation of carbon in organic substances, and for the analysis of gunpowder, after separating the nitrate of potash by solution in water.

4. *Estimation of Water.*—Vohl * estimates water present in substances readily oxidizable, in some instances, by heating them with an excess of bichromate of potash, dried at 392° Fahr. The bichromate of potash readily yields oxygen to many substances without any alteration of weight; consequently, when no volatile substance is present, the loss of weight gives the amount of water. Of course, this method is not applicable to organic substances or ammoniacal salts.

In some instances, there would be a reaction between the bichromate and the acid of the salt, with evolution of oxygen or chlorine, and then neutral chromate must be used. The bichromate is prepared for this purpose by crystallization and fusion, the neutral chromate is simply dried.

5. *Estimation of Lime.*—Vohl states that very accurate results may be obtained by treating the precipitate of oxalate of lime with bichromate of potash and sulphuric acid in the apparatus, used by Will and Fresenius for estimating carbonic acid.

The reaction in this case is represented by the equation—

$$3\,(CaO, C_2O_3) + KO, 2\,CrO_3 + 7\,SO_3 = 3\,CaO, SO_3 + KO, SO_3 + Cr_2O_3, + 3\,SO_3 + 6\,CO_2,$$

and the amount of lime is ascertained from the quantity of carbonic acid indicated by loss of weight by the proportion—$CaO : CO_2 = 84.396 : 132.000$.

The oxalate of lime may be washed by decantation, or upon a filter, then dissolved by boiling dilute hydrochloric acid, the solution evaporated, neutralized with ammonia, and, to prevent evolution of chlorine, mixed with a little oxide of mercury before adding the sulphuric acid.

---

* *Annalen der Chemie und Pharmacie*, May, 1855.

COST AND CONSUMPTION OF COAL AND PEAT GAS IN PARIS.

M. A. Chevallier* has recently published the following data relating to the use of gas in Paris :—

One hectoliter of French coal, such as is employed in the production of gas, costs in Paris at the highest 2 francs 25 centimes.

This coal yields for the hectoliter on the average 22 cubic meters of gas. One-third of the coke obtained simultaneously is used for heating the retorts, consequently two-thirds of the original value of the coal must be deducted, which reduces the actual cost of coal to 1 franc $11\frac{9}{10}$ centimes for 22 cubic meters of gas.

The gas companies affirm that the loss by leakage amounts to 16 per cent., which reduces the quantity of gas available from one hectoliter of coal by $3\frac{1}{2}$ cubic meters, so that only $18\frac{1}{2}$ cubic meters remain.

	Cent.
The cost of one cubic meter of gas is therefore	6.0
From this must be deducted the value of the tar and ammoniacal water	0.10
Leaving	5.90
To this must be added the—	
1. Supply tax	0.60
2. General expenses of all kinds	7.0
Cost price of one cubic meter of gas	13.50

The quantity of gas consumed in Paris amounts at present to the value 8,000,000 francs, at an average price of 22 cent. per cubic meter ; and the profit upon 40,000,000 cubic meters will, therefore, amount to 4,200,000 francs per annum.

Allowing interest for the invested capital requisite for the production of forty-eight to fifty millions cubic meters of gas, the cost of the cubic meter will be increased 2 per cent. and amount to $15\frac{1}{2}$ cent.

In addition to the high price of gas, it is a very great defect that there is no practical means of estimating the illuminating value. The meters merely indicate the quantity of gas consumed, not the quantity of light afforded. Various circumstances influence the nature of the gas furnished by the same kind of coal, consequently the price paid for gas is not always proportionate to the amount of light obtained.

For the production of peat gas two methods are adopted. The one consists in decomposing turf mixed with turf oil, the other is simply a decomposition of the oil obtained from peat by distillation.

The former method yields excellent gas when only twelve kilogrammes of oil are added to 100 kilogrammes of turf.

The illuminating value of this gas is generally five to seven times greater than that of coal gas. An experiment with a bat's-wing burner under a pressure of two cubic centimeters showed that 100 liters of peat gas give three times as much light as 142 liters of coal gas.

100 kilogrammes of turf yield 32 cubic meters of gas, the cost of which is more than covered by the sale of peat charcoal, when the price of peat is 15 francs per 1000 kilogr.

Taking the highest possible consumption of gas in Paris as fifty millions cubic meters, 166.666 tons of peat would be required for the supply, and would yield seventy-five millions kilogrammes (about 1,293,103 hectolitres) of peat charcoal. Upwards of three millions hectolitres of wood charcoal are annually consumed in Paris at a price of 14 francs per 100 kilogrammes, and as in the above calculation of the cost of peat gas the value of the peat charcoal is taken as only 7 francs per 100 kilogrammes, the cost of peat gas would consequently not be more than $1\frac{9}{10}$ cent. per cubic meter.

ALUMINIUM.

A fine bar of aluminium is now on view at the Polytechnic Institution, where Mr. Pepper explains its history and properties. This metal was discovered by Sir H. Davy in 1808. Oersted endeavoured to exhibit the metal in a detached form by the employment of chloride of aluminium, and about thirty years ago Wöhler suc-

* *Armengaud's Génie Industriel*, January, 1855.

ceeded in obtaining a few grains of it. It has been reserved, however, for M. St.-Clair Deville to produce (in the private laboratory of the Emperor of France) a whole bar of aluminium, which has been presented to Mr. Pepper by the Emperor. After giving a brief history of the metal, the non-success of experiments for obtaining it, and the "sodium" and "voltaic battery" processes, Mr. Pepper describes its nature and properties. "Aluminium" is classed by M Deville as an "unalterable" metal, intermediate between the precious and the more common metals. Mr. Fownes includes it in the same category as glucinum, yttrium, cerium, lanthanium, didymium, zirconium, and thorinum—all of them "metals of the earths proper."

The chemical properties of the metal are described in our number for September, 1854, page 118.

It is now, moreover, ascertained that the metal does not decompose water. Thus aluminium bids fair to become one of the most useful and serviceable of the metals, and from it have already been manufactured some medals and watch-wheels of exquisite workmanship.

ON THE DEODORIZING AND DISINFECTING PROPERTIES OF CHARCOAL, LIME, SAND, AND GRAVEL.

A LETTER appeared in *The Times* of August 22d, addressed by Dr. Sutherland to the Earl of Shaftesbury, on the sanitary measures which have been adopted for the benefit of our army in the Crimea, in which allusion is made to the use of charcoal, lime, sand, and gravel, for deodorizing and disinfecting purposes. Our attention has been directed to this letter by a correspondent, who thinks Dr. Sutherland is wrong in classing sand and gravel with charcoal and lime for the purposes specified. He enquires whether the action of sand and gravel is not purely mechanical, while that of charcoal and lime is chemical. The subject is one of considerable interest and importance, and one on which some difference of opinion may exist.

Dr. Sutherland says they use three deodorizing substances—charcoal, lime, and sand or gravel; that charcoal acts extremely well, and in small quantity; that lime also acts very well; and that sand or gravel, for certain purposes, is as good as either, but that a large quantity of this is required to produce the effect, and therefore its use is limited by the difficulty of carriage. He further states that any one of these substances would, he believes, act as a disinfecatnt, if a proper quantity were used. Lastly, he says that charcoal, in any ordinary quantity is not a disinfectant.

We are not prepared fully to adopt this opinion, but at the same time we do not think it is subject to the objection urged by our correspondent. There is reason to believe that a substance may act completely as a deodorizer while it acts but imperfectly, if at all, as a disinfectant. Dr. Sutherland adduces evidence in confirmation of this view. He says that a ship which took charcoal to Balaklava, having occasion to lay for some weeks in the harbour, close to the wharf, and not far from large accumulations of foul matter, had several cases of cholera on board, although the cargo was being discharged, and the men and every part of the vessel were covered with the dust of the charcoal, bags of which charcoal were piled up on the wharf close to the vessel. In this case the charcoal completely deodorized but did not disinfect the air on board the vessel; and to get rid of the disease it was found necessary to send the ship out of the harbour. Dr. Sutherland suggests that when charcoal is used in the ordinary quantities for deodorizing purposes, it would be wise not to apply to it the term "disinfectant," as it might lead to undue expectations, and cause other more efficient measures for disinfection to be neglected.

It is certainly a very important question to be determined, whether, and in what way, or to what extent the offensive odour of decomposing organic matter is connected with infection. We agree with Dr. Sutherland that the terms deodorizer and disinfectant ought not to be commonly used in connexion, as if the one effect necessarily followed the other. In fact, we know very little about infection, its real nature and the *modus operandi* of those substances which have been found or supposed to prevent contagion. It is generally considered that the poison of contagion is destroyed by a process of oxidation, a process similar to that by which offensive odours are usually got rid of. Admitting this, however, it does not follow that the two effects should be necessarily simultaneous.

Charcoal and lime are two of the best known substances for preventing the escape

of offensive odours from decomposing organic bodies; but these two substances do not act in precisely the same way. The action of the charcoal, in as far as the charcoal itself is concerned, is mechanical, that is to say, the charcoal does not enter into chemical combination with any of the elements present. On the other hand, the lime combines with some of the products of decomposition. But the true, most active, and efficient agent in destroying offensive odours, and also, as is assumed and generally believed, in destroying contagion, is atmospheric oxygen. Charcoal possesses the property in a very high degree of condensing gases upon its surface, and it is thus capable of bringing large quantities of atmospheric oxygen, in an active state, into contact with the noxious products of organic decompositions, and causing their destruction by an oxidizing action. The action of sand or gravel would be somewhat similar to that of charcoal, but with this difference, that sand and gravel are deficient in that property, which so remarkably distinguishes charcoal, of condensing gases on their surface. The sand or gravel acts simply as a porous mass, the interstices of which are filled with air, and the gaseous products of decomposition, on passing through this mass, are minutely divided and brought into intimate contact with atmospheric oxygen. Dr. Sutherland says, that a stratum of six inches thick of sand placed over ground filled with decomposing bodies entirely deodorized the soil. In this case we have no doubt the action of the sand was such as we have described.

THE ADULTERATION OF FOOD AND DRUGS.

Parliamentary Enquiry, continued from page 91.

Adjourned Meeting, Friday, July 27th.

Dr. Thomson said, the first remark he had to make with reference to water was the inferiority of London in this respect, compared with other parts of the country. The quantity of foreign matter in Thames water varied with the season and the locality. In September, 1854, the water supplied by the Southwark and Vauxhall Company contained 72.66 grains per gallon of solid matter. The water on March 15, 1855, contained 23.8; on the 7th of May, 32.2; on the 7th of June, 41.88; and on the 7th of July, 84.94 grains per gallon of solid matter. The water was taken from the locality of St. Thomas's Hospital. The reason of this was explained by reference to the diagrams produced, the first of which represented the comparative impurity of the water supplied by the different companies; the second the degree of hardness; and the third, the degree of organic matter present in the water. At Vauxhall, the mechanical impurity of the water was 60.50; organic matter, 5.28; inorganic, 36.64; total, 102.42. At Hungerford, mechanical impurity, 64.64; organic matter, 5.80; inorganic, 45.24; total, 115.68. At the south end of London Bridge, mechanical impurity, 63.44; organic matter, 4.72; inorganic, 45.08; total, 113.24 grains per gallon. The specimens were taken at the same hour of the same day, and about the time of high water. At low water, at Vauxhall, the mechanical impurity was 10.26; organic matter, 4.34; inorganic, 12.54; total, 27.14. At Hungerford, mechanical impurity, 16.80; organic matter, 8.40; inorganic, 23.64; total, 48.84. At the south end of London Bridge, mechanical impurity, 3.52; organic matter, 7.36; inorganic, 21.20; total, 32.08 grains per gallon; and at Greenwich, on the same day, the mechanical impurity was 3.07; organic matter, 19.44; inorganic, 72.52; making a total of 95.68 grains per gallon. Dr. Thomson explained that by mechanical impurity he intended matter which is diffused through the water, and can be removed by filtration; organic matter, that which remains in solution, and is not removable by filtration; and by inorganic matter, that which is not destructible by heat, and is also held in solution. The "low water" specimens were taken on the 2nd September, 1854, and the "high water" on the 8th of December, and after some continuance of dry weather. A specimen of water taken from alongside the *Dreadnought* hospital ship at Greenwich contained sea-water, 9.04; organic matter, 21.28; silica and clay, 69.68 in 100 parts. The difference between the water taken from the Thames at different places was due to the greater or less amount of sewage matter and sea-water. The water taken from cisterns supplied by the various companies contained carbonate of lime in the following proportions:—Lambeth Company, 10.144; West Middlesex, 9.190; Chelsea, 9.550; Southwark and Vauxhall, 10.070; New River, 11.985; East London, 11,997 ; Kent, 10.540 grains per gallon. The presence of the carbonate of lime necessitates the employment of a larger quantity of soap, and destroys the "caffeine" and "theine" in tea and coffee, and

materially interferes with the process of dyeing. At present the water obtained from the Thames was all more or less impure, but it would not be impossible to obtain a pure water supply; the great difficulty was in an engineering point of view. It could not, however, be from any pecuniary profit that the companies supplied it of an injurious quality. They might soften the water. The water in London was inferior to that supplied in other large towns, and even after filtration contained sewage matters. Shallow wells were often very injurious. He (Dr. Thomson) had found the water contain ammonia and nitric acid, and in many cases urine. On one occasion some water had been sent to him from a house on the south side of the river which was supplied by a shallow well. The children of the family complained of fever, and the water, being suspected, was examined and found to contain nitrate of ammonia and nitric acid. The well was shut up, and the illness ceased. He was convinced, from the result of his examinations, that cholera prevailed to a greater or less extent according to the impurity or purity of the water supplied to a particular district. The water in many places had improved lately. There was no water in the world without some impurity, except distilled water. He accounted for the greater amount of impurity in the water at high tide from the fact of the presence of sea water mingling with it. The water supplied to the metropolis might be improved by the application of lime, and he (Dr. Thomson) had been told by engineers who had purified water in large quantities upon what was called "Dr. Clarke's principle," that it was perfectly practicable to any extent. Boiling the water discharged a large quantity of the carbonate of lime, but not the magnesia. Filtration by charcoal had been employed on a large scale. Was aware that by an act passed in 1852, all the companies were required to filter their water after a certain date (December, 1856). Had some doubts whether filtration through charcoal would remove the organic as well as the mechanical impurities. It would remove the colouring matter.

With regard to the adulteration of drugs, Dr. Thomson said nearly every one was adulterated. At St. Thomas's Hospital every drug before being purchased was subject to examination; all found impure were rejected. Had frequently to reject one-third of the drugs examined. At one time he (Dr. Thomson) was called on to name a druggist to supply the hospital, and after inquiry, selected one who he was told would supply the purest drug, but in executing the first order, he sent a preparation which contained two or three other substances which ought not to have been present, and since that time a list of the substances required had been made out by the Drug Committee, and sent to the best houses in London, and selections were made from the specimens they sent in. The reason they did not procure all their drugs from Apothecaries' Hall was because it was considered a monopoly. If they sold the best drugs it might be wise economy to do so to a certain extent.

Dr. Thomson proceeded to say that he gave evidence before a Committee of the House of Commons in 1838, and pointed out many substances as impure and adulterated, and he found the same practices still continued. One druggist sold any powdered drug that might be asked for at 36*s*. per cwt., whatever might be the price. The buyer in this case would, of course, know he was purchasing an inferior article. He (Dr. Thomson) had known extract of opium mixed with extract of senna, and 30 to 60 per cent. of water. The purest scammony it was possible to procure contained a large quantity of starch as imported. He believed opium was less adulterated than other articles. Of hydrocyanic acid one sample which ought to have been of a certain strength (represented by 2) was only 1.32, and another sample was as high as 2.38. It was, therefore, impossible any medical man could depend on the effect of his prescription. In one case it would not produce the desired result, and in the other it would be most injurious.

Dr. Thomson proceeded to enumerate several other drugs, the strength of which varied very considerably in different samples, and mentioned, among others, calamine, or carbonate of zinc, which was once very much used as an ointment for dressing wounds, but, owing chiefly to the great difficulty in obtaining it pure, it was not so much employed as formerly. This substance was sometimes found to be made up of sulphate of barytes, chalk, and ochre, without a trace of the carbonate of zinc; and in the samples at St. Thomas's Hospital, which had been rejected, one contained $6\frac{1}{2}$ per cent. of the oxide of zinc, and another 57.76 per cent. of the same substance. Two samples contained white lead. These analyses took place within the last eighteen months. He had often heard medical men complain of the uncertainty they felt as to the effect of their prescriptions, owing to the different

qualities of drugs. He believed there was no way of meeting the evil, except by having a public inspector. The knowledge of there being such an officer would lead to great good, and he saw no difficulty in it. There might be one or more public officers to whom all questions of difficulty might be referred. He had much experience in the Excise, and no difficulty was experienced there in detecting the adulteration of tobacco. The present Chairman of the Board had introduced a chemical education among a certain number of the officers. The appointment of an inspector would not only prevent fraud, but also contribute to the public health and morality. The samples which had been examined, and found to be adulterated, were obtained from both wholesale and retail druggists, and most of the drugs had passed through the hands of the "grinder." In saying that drugs were not purchased at Apothecaries' Hall for the use of the hospital because it was a monopoly, he intended no reflection upon the Hall; he merely meant that to procure all their drugs at one place would be a monopoly.

Mr. T. Blackwell (of the firm of Crosse and Blackwell, wholesale pickle and sauce manufacturers), in answer to the chairman, said he was formerly in the habit of using copper vessels for the preparation of pickles, &c. The mode of operation was to boil the vinegar in the copper vessel a certain time, and then allow it to cool. It was then boiled a second, and afterwards a third time in the copper vessel, the result of which was that the vinegar became a bright green, owing to the action of the vinegar on the copper. The first boiling made it yellow, the second produced a green tint, and the third was found to produce the desired colour. Since the publication of the articles in the *Lancet* this practice had been abandoned, as far as possible, by the substitution of iron vessels coated with glass, in place of the copper. Silver vessels were tried, but owing to the chemical action produced, they turned everything black. Only one boiling was performed in the copper vessels now. The colour of pickles in most respectable houses was not so green as formerly. A considerable diminution of custom was found after the alteration was first adopted, especially in the foreign trade. They wrote to say they did not like the loss of colour. His firm employed 200 hands in the export trade. The old colouring process he did not consider prejudicial to health, if the manufacturers were careful. In anchovy sauce, bole Armenian was used to colour it. The fish being a very unsightly brown colour as imported, it was always the custom of the trade to make it a bright red colour by the addition of 10lb. of bole Armenian to 100 gallons of sauce.

Mr. Blackwell said that since last Saturday, in consequence of the evidence before the Committee, his firm had issued a circular to the trade, stating that in future they should sell nothing but the uncoloured sauce. It was more to their interest to sell the pure than the impure article, but there was nothing deleterious in the colouring matter. He had had one answer to his circular, saying that the absence of the colour in the sauce would be an objection. The taste was much improved by the absence of the colouring matter. Had never heard of red lead being used by any house in the trade. He had formerly manufactured both green and white gooseberries, but withdrew them in consequence of what appeared in the *Lancet*. No complaints had ever been made to his firm with regard to any of the articles sold, but he had often wondered, because when the gooseberry pie was cut open, it appeared most unnaturally green.

Mr. Redwood, Professor of Chemistry to the Pharmaceutical Society in Bloomsbury Square, said he had had occasion, during the fourteen years he had been connected with the Society, to examine minutely the various drugs and medicines of this and other countries. He thought in the evidence given before the Committee there had not been a sufficient distinction drawn between impurities and adulteration. Absolute purity in most cases was unattainable, or attained only at a cost which rendered it undesirable; and for all the purposes for which they were required, he considered that drugs, &c., might be obtained sufficiently pure, and he considered it highly undesirable that any regulation should be enforced prohibiting the manufacture of cheaper drugs or chemicals. If a pure article were required, it could be procured. Mr. Redwood proceeded to illustrate his argument by referring to the substance, cyanide of potassium, so largely used in electro-plating, and where absolute purity was not required; it was manufactured for the purpose at 3*s.* 6*d.* apound, whereas the pure article would be 1*s.* 6*d.* an ounce. In photography the chemicals were required absolutely pure, and these could be obtained. Mr. Redwood referred to the impurities in such substances as carbonate of

potass, nitrate of potass, Epsom salts, and cyanide of potassium, as the result of the adoption of cheap processes for their production, and that their manufacture should not be discouraged as adulterations. The same remark applied to carbonate of soda, which was manufactured on an immense scale in this country for the production of soap, for which purpose it was not required pure; and it would be a public injury to raise the price by compelling the manufacturer to make it pure. He had no doubt that in many of the low districts especially there was considerable adulteration of medicines, but the best remedy would be a better knowledge on the part of both buyer and seller. He did not wish to deny the fact of adulteration or to justify it, but many men of high standing in the commercial world were looking with great anxiety at the proceedings before the Committee, as much that had gone forth to the public had a great tendency to deceive them. He considered it most important to make a distinction between fraudulent adulterations and the cases he had mentioned.

The CHAIRMAN said the Committee would meet again on Tuesday next, at half-past twelve o'clock, and would hear further evidence from Mr. Redwood.

Adjourned Meeting, Tuesday, July 31.

Mr. REDWOOD, in continuation of his former evidence, said the substances to which he had referred on the last occasion were sufficiently pure for the purposes to which they were applied. He now wished to refer to other substances which had been described by previous witnesses as subject to great adulterations, but which according to his experience were in a state of irreproachable purity; exceptions were exceedingly rare. Carbonate of soda, for example, as it was commonly called, or bi carbonate of soda as it was in reality, was not subject to adulteration. Of forty samples which he had obtained, in only one was there any appreciable amount of impurity. Since the last meeting of the Committee, Dr. Normandy had brought to him a sample of soda for analysis, which contained twelve per cent. of sulphate of soda. This was not an adulteration, but an impurity, which rendered it unfit for medicine; but the forty specimens, some of which were obtained from the same neighbourhood, he (Mr. Redwood) had found pure, except that some were slightly deficient in carbonic acid, owing to exposure to the air. The substance calomel was said to be adulterated with 60 per cent. of sulphate of barytes and carbonate of lime; but in his experience he had found it in a state of great purity. There was no country in the world in which calomel was prepared in such purity as in England. He had obtained fifty-one samples of calomel from all the low neighbourhoods of London, and no one of them was adulterated. Iodine, said to be adulterated with water and blacklead, he had never found so impregnated, and large dealers had assured him that they had never met with such an adulteration. He conceived that no one would charge the retail dealers with adulterations; they were a body above suspicion, and it was owing to them cases had been detected and exposed. A certain amount of adulteration is effected by the drug-grinders, as most drugs in their crude state do not admit of it. Sometimes inert matter, such as sawdust, was found mixed with the drugs. This might arise from that substance being put into the mill for the purpose of cleaning it. He entirely acquitted the retail dealers in drugs, even in the poorest neighbourhoods, of all participation in the sort of adulteration now referred to, and divided the responsibility between the wholesale trader and the drug-grinder. He would not dispute the opinion of medical men, that you must be careful where you obtain drugs; but the evil of adulteration had been very much exaggerated, and especially by the gentlemen who had given their evidence before the Committee. Even if a stop were put to what they called adulterations, there might still be as much disparity in medicines as there was at present. Nature was by far the greatest adulterator. In the drugs derived from the vegetable kingdom, scarcely two samples were alike, and much skill and experience were required to select the best from the inferior. Much disparity in the quality of drugs and medicines arose from want of proper knowledge on the part of retail Druggists. This led to defective selection and preparation of medicines. With regard to cod-liver oil, there was no doubt medical men were in the habit of recommending their patients to go to particular establishments, where they believed this or other drugs were the purest; but it was not within his (Mr. Redwood's) knowledge that cod-liver oil was extensively adulterated. It might be obtained pure from many places where it was manufactured. The same remark applied to sarsaparilla. His evidence was the result of a

long course of inquiries during the last thirty years. In the majority of cases, druggists do not analyse their drugs themselves, but judge of the purity according to their external characters and the price asked for them, but a number of druggists are capable, and also make a constant practice of analysing their drugs, and this number has greatly increased during the last ten or fourteen years. He had heard the statement of Dr. Thomson that one drug-broker offered to supply any ground drug at a uniform price of 36s. per cwt., and he (Mr. Redwood) believed, to some extent, it was true. There was a large manufacturer of chemicals, who had stated if an order was brought to him for an article at a certain price, he would supply the article at that price, and produce the best thing he could. The responsibility would rest with the person giving the order. This, no doubt, was a most fearful imposition on the public. Inferior drugs were generally confined to low neighbourhoods, and were the result of competition in price. Witness had never found magnesia to be adulterated, although lime was said to be mixed with it in some instances. He would now state what he considered the difference between impurities and adulteration. An adulteration was the addition of some substance with a view to deteriorate the quality of the body to which it was added. There were two classes—viz., "fraudulent" adulteration and "conventional" adulteration. By the latter term he intended those cases where the sanction of the consumer was given, whether directly or indirectly, to the practice. Fraudulent adulterations of drugs were of rare occurrence, and as soon as detected were put a stop to. He had heard Dr. Thomson's evidence that the same adulterations were still going on as he had spoken to in his evidence in 1830, but Dr. Thomson was very much deceived on the subject.

Mr. Redwood then proceeded to enumerate the cases of adulteration which had been brought under the notice of the Pharmaceutical Society during the last fourteen years. Among the cases were those of morphia, isinglass, borax, and lard. The latter substance was adulterated with flour, as imported from America. He believed the English lard not to be adulterated, but had not extensively examined it. The character of drugs had greatly improved lately. The Druggists were better educated, and were able to make a more judicious selection of drugs for use. Drugs were not formerly produced in so pure a state as they are now. Scammony was an instance; ten years ago it was impossible to obtain a pure specimen as imported, but now, owing to Druggists rejecting the adulterated article, it would be occasionally met with entirely free from any admixture, but yet at such prices that it was impossible to sell it in many places. Opium never found its way into this country pure. It was well known to be a heterogeneous substance. Dr. Thomson had stated the best opium was the Indian opium, but this sort had no sale, in consequence of its inferior quality. His (Mr. Redwood's) opinion entirely differed from Dr. Thomson's on this point. The adulteration of opium was a conventional one. It was known not to be a simple substance, and was accepted by the public and medical men as such. It might be called an adulterated substance, but the adulteration was sanctioned by all parties. He should consider the colouring matter of sugar-plums and other confectionery as a conventional adulteration, and also the colouring of anchovies. Pickles might come under the same denomination. A noxious adulteration might be a conventional one, that is, the public taste might be wrong.

Mr. Redwood then enumerated various substances to prove that the public were not disposed at first to sanction any change in the appearance of an article, even though it might be purer. These were all what might be termed conventional adulterations. Calamine was referred to by Dr. Thomson. This substance was very little used now, and ought to be classed among such substances as "the moss growing on a dead man's skull," which was formerly to be found in the Pharmacopœia. The public were accustomed to judge of calamine by the brightness of its colour, but the pure substance was the reverse. He might also mention here that there was no true bole Armenian in this country, and had not been for centuries. It was a mixture of chalk, pipeclay, and oxide of iron to give it a colour. Oxide of zinc was directed by the College of Physicians in 1824 to be prepared by a process which yielded a perfectly white powder. That powder, however, was not pure oxide of zinc, and in 1836 the College altered the process for one which yielded a pure oxide; but this is not quite white. The Druggists and some medical men, having been accustomed to the white (impure) oxide of zinc, frequently reject the purer article, because it is not white. Milk of sulphur was ordered by the College of Physicians in 1721 to be made by a process which yielded an impure product, containing a large quantity of sulphate of lime. This process was afterwards

altered; but the purer product differs in colour and other properties from the impure, and it has been found difficult to induce the public to take the pure.

With regard to gin, oil of vitriol, oil of almonds, salt of tartar, and alum were added by the dealers in gin for much the same reason that isinglass was used by dealers in beer—viz., to "fine" it. It had become the practice to make the retail price of gin to the public nearly the same as that of the wholesale dealer to the publican, and the latter made his profit by reducing the strength of the gin after it came into his hands. He (Mr. Redwood) had been in communication with various distillers upon this subject since the Committee last sat, and he begged to say that gin was manufactured of certain substances, such as juniper berries and coriander seeds, and was, in point of fact, a pure flavoured spirit, which was unexceptionable in its quality. It was supplied to the publicans at a certain strength, and they, by the addition of water, &c., adapted it to the taste of their customers. The public was not damaged by this, as it was the same as if the distiller had watered it. The effect of this dilution by water was to impair its transparency; it therefore required fining, and this was done by introducing into it salt of tartar and alum. The objection to selling an undiluted article was, that the public would have better means of knowing what the profits of the dealer were. He thought the principle of the dealer mixing water with milk, instead of allowing people to do it themselves, stood on a different basis. The public were not damaged by the dilution; but they were when certain things were added to replenish the strength lost. He did not think cocculus indicus was much used; there was very little in the country. He believed the publican resorted to this dilution of the spirit to keep the public in ignorance of the profits of his business. This adulteration of gin was not prejudicial to the public health—in fact, it was rather beneficial than otherwise that they should not take so strong a spirit. If the publican did not reduce the strength, the distiller would. He (Mr. Redwood) had heard of such a person as the "publican's adulterator," who instructed them in the art of mixing and compounding spirits, &c. In every business there was an amount of art and mystery, and it was so with the publican, who thought he knew a great deal connected with his business that the public did not. Gin did not come direct from the distiller, but from the rectifier. It was very little adulterated with substances prejudicial to health, but beer was, he believed, more so. The statements made to the Committee with regard to the adulteration of gin were very vague, and if the witnesses had been cross-examined, their evidence would have borne a very different complexion. He admitted the fact of various substances being added to gin, but denied they were injurious. Oil of vitriol and oil of almonds were used under the denomination of "beading," and it was somewhat alarming to hear that these were always added to gin. The mixture consisted of sixty drops of oil of vitriol, and an equal quantity of oil of almonds triturated in a mortar with half-a-pint of strong spirit. This was added to 100 gallons of gin, so that there would be about one drop of oil of vitriol to a gallon (or one to 70,000), a quantity so small as to be entirely inappreciable, and which would have no effect upon the person drinking it. The application of this mixture produces a briskness in the spirit which it would not have without it.

Lord Goderich.—Then I do not misrepresent you when I say that the object of adding the beading is to produce the same appearance in the spirit when mixed with water, which would have been produced by the pure spirit before the water was added? Certainly.

Lord Ebrington.—Then the public is not injured, but deceived? Yes.

In answer to several other questions from hon. members of the Committee, Mr. Redwood said the term "gin" was an artificial term, and might apply to the mixture described, as well as to the pure spirit. It might be that in consequence of the disclosures before the Committee some publicans would advertise "unadulterated gin," but he did not think it would be less adulterated nevertheless. Cayenne pepper is sometimes added to give an appearance of strength by its effect upon the palate, but he believed the use of such substances exceedingly rare. The public generally obtained gin in the shape of a perfectly wholesome beverage, but where such substances were used, of course it was objectionable. He had also met with sulphate of iron in beer, but did not think it injurious in the small quantity in which it was used.

By Mr. Moffatt.—The Pharmaceutical Society has been established fourteen years, and consists of 3000 members, composed of the leading people engaged in vending drugs throughout the country.

Adjourned Meeting, Wednesday, August 1st.

Mr. Thomas Herring, wholesale chemist and druggist, said he had been in business for the last forty years. He would show the Committee what was going on at the present day. At a sale during the last week or fortnight at Garraway's some scammony, which would cost when pure 40*s.* a lb, was sold for 3*s.* It had not a particle of the original substance; and, to show how difficult it was to get a pure article, he had examined four parcels of scammony as imported by himself and others, and none were pure. One contained only 70 per cent. of scammony, and that was considered a very good article, and another contained 90 per cent. of chalk. This adulteration was very injurious, as a prescription in which this was used, instead of being an aperient, would act as an astringent. Another substance was opium. This was always adulterated, and was sometimes sold for 4*s.* per lb., when witness would have been glad to give 20*s.* for a good article. No medicine ought to be used but what was pure. In America they examine all drugs imported, and those found to be adulterated are rejected. This inspection only applied to drugs imported into the country. The opium comes from Aleppo generally. None is allowed to come from India. He was convinced that the best way of stopping adulteration would be the appointment of an inspector, who should be a pharmaceutical chemist, and should have a liberal salary, so that his attention need not be directed to other matters. He should have power to enter any shop and demand an inspection of the drugs, and any found unfit for compounding should be confiscated. Since 1841 the chemists of this country had greatly improved in education, and they must know perfectly well when they sell inferior drugs. It would be an insult now to offer to any respectable house an inferior article such as the sample of scammony produced. No doubt there was a large sale of adulterated and inferior drugs, and for the very good reason, that it gave a larger profit. This was an injury to the consumer. No doubt, some Chemists and Druggists did not scruple to sell impure drugs, but as a body they set their faces against anything of the kind. Had not the slightest doubt that all respectable houses would be delighted at the appointment of such an inspector. With regard to the adulteration of soda, he could see no reason for it, the price being so low. If rhubarb were sold at 8*s.* a pound in the lump, but when powdered it could be had for 4*s.*, the public must know there was an adulteration, or it could not be sold at so low a price. He had heard there was a grower at Banbury who sold annually twenty tons of English rhubarb, and witness believed it was so far true that the person in question did grow perhaps as much as half that amount. It was worth about 40*s.* per cwt., or 5*d.* per pound, was of a very pretty colour, and produced a certain amount of irritation, but no good effect whatever. Calomel was said to be adulterated with chalk. This could not be the case, in witness's opinion, as the substance added for the purpose of adulteration always bore a close resemblance to the original, which would not be the case here.

Mr. Herring proceeded to say there were three authorized Pharmacopœias for the preparation of drugs—viz., at Dublin, Edinburgh, and London, and the effect of this was that a prescription made up at one place would contain double the quantity of a particular drug that it would if made up at another. The Edinburgh Pharmacopœia was twice the strength of the London, and a prescription containing opium or prussic acid would have twice as much of these powerful drugs in one case as it would in the other. The College of Physicians and Chemists were now working to form a national Pharmacopœia, and it was quite necessary. Has not paid particular attention to the patent medicines. The composition of some was known, but others it was quite impossible to determine. Their popularity was entirely due to the system of advertising; discontinue this, and there would be an end of them.

Mr. Simmons, the author of a work on *Vegetable Productions*, read a list of various articles the adulteration of which was a loss to the revenue, as he assumed that if the adulterations were not permitted so much larger a quantity of the pure substance would be required by the consumer.

Mr. Simmons then read some extracts from the American Act passed in 1848, prohibiting the importation of adulterated drugs and medicines, and appointing inspectors to examine all importations, and giving them power, if any adulteration was detected, to confiscate or re-ship all such substances. The witness went on to state that he believed the adulteration of beer to be very extensive, from the fact that, while the consumption of malt liquors both in the home and export trade had largely increased of late years, yet the duty on hops had remained stationary, even if it had not declined, showing clearly that some other substance must be used in

place of the hops, which was a great loss of revenue. The adulteration of beer was much greater on Saturday nights than at any other time, particularly in the suburbs of London, and that bowel complaints were much more prevalent on Sundays owing to this ; he thought that the numerous cases of drunkenness at the police-courts on Mondays were much more owing to the employment of noxious ingredients in the beer, which produced a stupefying effect, than to other causes, but he only judged from what he had been told ; he did not speak as a chemist.

Mr. John Postgate, surgeon, of Birmingham, spoke particularly as to the adulteration of bread with alum, and fully confirmed the evidence of preceding witnesses.

In answer to a question whether there was any simple test for the presence of alum in bread, Mr. Postgate said if rain-water were poured over a slice of bread, and allowed to remain some time and then filtered, on the application of ammonia (or hartshorn), the alum, if present, would appear in the form of flocculent matter. The appointment of a public inspector and prosecutor in the case of detected adulterations was very desirable. The person practising a pernicious adulteration should be punished with fine and imprisonment, and a little hard labour would do him good.

Adjourned Meeting, Monday, August 6th.

Mr. C. H. Burton, of 14, Furnival's Inn, said, he was aware of the existence of an invention for forming chicory into the shape of coffee berries. It was patented by a Dr. Duckworth, of Liverpool, in 1851, and witness had taken a sample of the mixture. The imitation of the coffee berry would not be detected by the general public ; but he thought the invention did not give a very remunerative return, as it was not extensively used.

Mr. George Phillips, chief officer of the Chemical Department of the Board of Inland Revenue, said, the articles coming under his special supervision were various, and he would read to the Committee a list of samples sent to him as "suspected," by the various officers of the Board. The list included all samples sent in from the 30th of October, 1843, to the present time—a period of $11\frac{3}{4}$ years. During that period, 1139 samples of beer were received ; 1116 of pepper ; 12183 of coffee ; 187 of soap ; 1616 of tobacco ; 40 of hops ; 105 of spirits ; 47 of sweets (or British wines); 2 of foreign wines; 1 of vinegar; 142 of tea; and 390 various, making a total of 17,268 samples. Of these, 51.6 per cent. of the pepper samples were found to be adulterated ; 12.9 per cent. of the coffee; 54.2 per cent. of the tea; 64.1 of the tobacco, and 87.5 of the hops. These last referred to the samples taken from the brewers. The beer was only sent up to be examined as to the gravity at which it was brewed, and upon that a drawback was allowed on all beer exported. There were only twelve samples sent up that were supposed to be adulterated. The majority were examined as to their gravity, but if any adulterating substance were discovered during the examination, the trader would be proceeded against. No inquiry is made as to the strength of beer for home consumption ; but informations are laid against publicans for having in their possession such substances as grains of paradise, cocculus indicus, &c. The officers go down and examine the publicans' cellars if there is any suspicion, and sometimes succeed in discovering these mixtures, and the man in the very act of adulteration. They are proceeded against for the loss of duty, and it is against the tenor of the publican's licence to have such substances on his premises. He believed the penalty for adulterating beer to defraud the revenue was £200. There were sixty or seventy supervisors who were educated as analytical chemists, and they were spread over the country. As the law at present stood, a man could not sell a mixture of chicory and coffee without a label on the packet stating it was so. The regulation was, that this notification should be legibly printed ; if it were not, the trader would be proceeded against. Many cases had occurred in which this had been done.

In answer to various questions, Mr. Phillips said chicory itself was adulterated to the extent of 60 or 70 per cent. It was not largely imported into this country, as it was extensively grown here ; and his belief was that the public preferred a mixture of chicory and coffee. He had known one case in which a mixture of chicory and coffee contained 95 per cent. of chicory, and yet this would be legal. With regard to gin, he did not think the revenue was injured by the mixtures. It was a question for the public, and if they did not like one man's spirit they could go to another. If publicans were compelled to sell a proof spirit, there would be less gin drunk than at present. The price was simply a question of strength. The duty was levied on the proof spirit at the distillery, and he thought water could not be

viewed as an adulteration. It was a question between the buyer and the seller. If any deleterious matter were introduced, the person should be proceeded against; but during the past twelve years he did not recollect a sample which was discovered to be adulterated. Hops he had found adulterated with cocculus indicus, grains of paradise, quassia, cherrita, gentian, chamomile flowers, coriander seed, and, in one instance, exhausted tobacco. Grains of paradise were most largely used, and were not at all prejudicial to health. He had never found strychnine in beer, and there was no foundation for the report some years ago that this substance was used. Tea, as imported, contained gum, indigo, vegetable yellow, Prussian blue, carbonate of magnesia, sulphate of lime, and silica; and teas made up in this country contained re-dried tea-leaves, leaves of other plants, and most of the substances before mentioned. Carbonate of copper was only once found. The manufacture of tea in this country existed to some extent at one time, but he had no reason to believe it continued now. The origin of the manufacture arose from this circumstance—viz., in 1841 there were two cargoes of damaged tea in bond, and permission was given to make the best use they could of them. A person connected with the tea trade washed the tea, re-dried it in a kiln, and it then found its way into the market at reduced prices. After this cargo was gone, the trade wanted something else to reduce the price of tea, and re-dried tea-leaves were brought in, the custom being for persons to go round to the different hotels and other places and buy up the exhausted tea-leaves, and, this supply proving insufficient, recourse was had to British leaves. On one occasion he had examined a cargo of tea in the docks, which was adulterated to the extent of 49 per cent., but, as this was discovered to be a foreign adulteration, it was given up. The Excise had no difficulty in crushing the trade in British tea as soon as it was discovered, and he believed there could not be any manufacture of the sort now. One great adulteration of tea was "facing." If indigo alone were employed for this purpose, it would not be very injurious, but Prussian blue was often used, and this was most pernicious.

In reply to a question from the chairman, the witness said that many means were at the disposal of chemists now for detecting adulterations which they did not possess formerly, especially the microscope.

Referring to the adulterations of snuff, some were recognized by law, such as the addition of common salt and the alkaline salts to Scotch rappee, and lime-water only to Irish and Welsh. He had found in the various samples analyzed common peat, starch, ground wood of various kinds, extract of logwood, chromate of lead, and bichromate of potassa. Some spurious snuffs were composed of such substances as sumach, umber, Spanish brown, common salt, ground coal, peat, extract of logwood, lime, sand, &c. The whole of these samples were scented, and were made up for the purpose of mixing with other snuffs. They contained no tobacco at all. Fustic was found in Irish snuffs to the extent of 10 per cent. Tobacco was found to contain liquorice, gum, indigo, common salt, saltpetre, various nitres, yellow ochre, Epsom salts, red sandstone, &c. The adulteration of tobacco at one time was very large, for the law had allowed it for a short time, but the experiment was so unsuccessful as regarded the revenue that it was necessary to put a stop to it. It was never contemplated the trade would exhibit such ingenuity as they did in introducing other substances to the extent of 70 per cent. At the present moment no adulteration was allowed; water was the only thing permitted, but this might be introduced in any quantity. He did not think the loss at the present moment was more than 8 per cent. In 1846 a complaint was made to the Excise relative to the adulteration of cocoa, and in consequence witness visited all the cocoa manufactories in London, and the statement that it was adulterated with a large quantity of earthy matter was not found to be confirmed on analysis. Were it not for the addition of starch and some saccharine matter, the consumption of cocoa would greatly diminish, as it would become unpalatable.

In answer to further questions, Mr. Phillips said mere chemical knowledge was not the only thing requisite for an examiner. He should combine scientific and practical knowledge. The Board of Inland Revenue were at this moment educating young men for the office of supervisors. They were sent to the University at the expense of the Board, and after remaining there two or three years came back to witness, and were put under the superintendence of older hands, and sent round with them to the various places. It was a mistake to imagine beer was adulterated to the extent that had been stated, although no doubt it did exist. The number of license

dealers in the United Kingdom was as follows:—viz., brewers, 41,446; beer retailers, 131,468; tea, coffee, and pepper dealers, 142,747; tobacco dealers, 236,647; and tobacco manufacturers, 571. Every one of these was subject to examination by the officers of the Excise, and witness took credit to them for the detection of every adulteration, if it existed at any time. The total number of inspecting officers was about 4000. He had not read Dr. Hassall's work, but from the extracts from his reports that had been published, he (Mr. Phillips) thought he had grossly exaggerated, and he said this from his own experience, which, in the article beer especially had been greater than Dr. Hassall's. Out of 1139 samples of beer he (Mr. Phillips) had examined, twelve only were adulterated. The beer examined was chiefly that sold by the brewers.

Adjourned Meeting, Wednesday, August 8th.

Mr. Richard Archer Wallington, solicitor, and chairman of the Leamington Local Board of Health, said—he concurred with the opinion of Mr. Redwood and Mr. Phillips, that the extent of adulteration had been much exaggerated, and that, as far as the tests were concerned, they had not been fairly dealt with. Although it was not necessary, in the remedy he was about to propose, to draw a distinction between noxious and innoxious adulterations, generally he should wish to draw a distinction between them. He wished to show that the latter might be beneficial, and ought to be encouraged as tending to reduce the price of articles. He would, in illustration, draw the attention of the Committee to the substitution of articles of home produce or manufacture for those of foreign produce. Competition would regulate the price of every article. If coffee had not to contend with the competition of chicory it would be much dearer than it was now. He considered it perfectly justifiable to mix chicory with coffee or any foreign innoxious substance, at whatever price the trade could get for it. He believed the public were sufficiently protected by competition. It was a sufficient protection for them to get the article at a proper price. He agreed as a matter of theory that the public ought to have what they asked for, but practically it would be impossible. To work out the theory would be a great injury to the public by destroying competition. He would prevent any adulteration that was noxious and injurious to the public health most certainly; but did not think it was possible to define by any act of Parliament what was an adulteration.

Witness then stated that his experience was founded chiefly on the knowledge he had acquired, owing to his connexion with a patent for producing a substance called "Patent refined isinglass." The patent succeeded, and was in existence now. It was a mistake to suppose that pure gelatine did not possess the same qualities as isinglass. The patent article was called "isinglass" because, before it was introduced, an article of very inferior quality was sold under the name of "gelatine." If pure, there would not be any difference in price. In answer to a question why the brewer did not buy gelatine instead of isinglass for fining his beer, the former being so much cheaper, Mr. Wallington said, this was the strongest illustration of his argument, as isinglass best suited for food was not used for the fining purposes.

Mr. Kinnaird.—Gelatine is the result of boiling the fishes' bladder, and isinglass is a substance which has not undergone that process?—Most decidedly.

The elementary composition of gelatine and isinglass is identical, less the impurities in the latter.

Witness then produced specimens of Russian isinglass and the patent gelatine, and said, the samples had been submitted to comparative analysis twenty times by the first authorities, and the result confirmed the statement he had made. The difficulty in legislating upon the subject Mr. Wallington said was to define the term "adulteration" in the Act of Parliament; and, in order to get rid of the difficulty, he proposed that the Board of Trade, or the Treasury, or any other official department, should, from time to time, issue a minute prohibiting the sale, use, manufacture, or importation of articles which in their opinion were injurious or fraudulently adulterated. The Government would have the power to call in to their assistance the best opinions that could be obtained for the time being. He objected to a Board of Examiners, because, although on some subjects they might be competent to decide, on others they might be at a loss. The next point was, how to detect and prevent the adulteration. He thoroughly disagreed with Dr. Hassall's plan of inspectorships. Chemical analyses and the use of the microscope would be extremely useful to the Government in determining what should not be used. The means that he would suggest were, in suspected cases, to permit interrogatories to be filed as

against any person selling the articles prohibited, whereby he would be required to answer upon oath all questions put to him. He would either admit his guilt or maintain his innocence. If the fact were admitted, he (Mr. Wallington) would proceed by injunction to prevent the practice being continued, and, if the person did not obey the injunction, he would be proceeded against for contempt of Court. If he denied his guilt it might be referred to a jury, through the intervention of the County Court, and, if found guilty, the injunction would proceed in the same way. The person, if committed for contempt, might clear himself by giving a sufficient guarantee to the Court that he would not continue the practice, and the sufficiency of this guarantee would be in the discretion of the Judge.

In answer to various questions, Mr. Wallington said, the difficulty attending the appointment of inspectors who should analyze all articles brought to them was, that it was difficult to get two scientific men to agree upon anything. The expense of the staff of inspectors, if efficient, would be enormous, and the inquisitorial nature of their duties would not be tolerated by the trade. The innocence or guilt of the persons accused would best be established by evidence in the ordinary way, rather than by relying upon any scientific examination, which might be open to suspicion, and in result doubtful. The assistants and workmen of the accused might also, if necessary, be examined, and his books and premises inspected under proper regulation. He admitted that many adulterations were made in order to secure a larger profit to the trader. He would not allow interrogatories to be filed until a *primâ facie* case of adulteration had been made out. Instead of having recourse to inspectors, he would see whether the trade would not work its own remedy. His opinion was, there would be ample force to put the "minute" in operation, if enactments were made prohibiting adulteration. Every person manufacturing a pure article would put the law in force against an offender. If, however, this did not work a cure, recourse might then be had to inspectors, which, however, witness did not recommend.

Mr. Wallington was afterwards recalled, when he stated that he suggested his plan as a general remedy, but special cases might arise which would require the special interference of Parliament.

Mr. Postgate, in continuation of his evidence given on a former occasion, said, he had lately tested two samples of bread and two of flour, submitted to him by Mr. Brown, of Wolverhampton; in each sample he had detected alum, and a sample of tea from the same place contained beech leaves and catechu. With regard to the adulteration of mustard, he did not agree with what had been stated by some other witnesses, that there was a conventional standard for mustard, by which medical men could estimate the strength in making their prescriptions. Medical men, on the contrary, were greatly perplexed in consequence of the variation in quality of this substance. It was adulterated with flour or turmeric. In three samples of cayenne he had found red lead. Cyanide of potassium was adulterated to such an extent by the admixture of potash, that the electro-platers in Birmingham had great difficulty in plating their goods. A workman who undertook some special plating often made it a stipulation that he should make the cyanide of potassium for himself. The potashes cost 4*d.* per lb., and the cyanide from 2*s.* 6*d.* to 4*s.* Drugs were much adulterated; quinine contained an alkaloid obtained from the willow bark, called salicine, the price of which was 1*s.* 9*d.*, while quinine cost 9*s.* Quinidine was often used for it. Tamarinds were found adulterated, sometimes with sulphuric acid. Milk of sulphur contained often 50 per cent. of plaster of Paris. Scammony, white precipitate, oxide of antimony, and various other preparations were all more or less adulterated.

The witness here produced samples of a medicine sold as "concentrated castor-oil capsules," which contained nothing but croton-oil, which was a very violent purgative. Castor-oil could not be concentrated, and therefore these capsules were a gross imposition, and the sale of these capsules still continued at Birmingham. He had also examined various essential oils at one shop, all of which were adulterated with fixed oils, which materially affected their value. Witness here produced to the Committee several letters from druggists and others, confirming the existence of great adulteration in drugs. One letter stated, many lives had been lost owing to the use of adulterated drugs.

Mr. H. Letheby, M.B., Professor of Chemistry and Toxicology in the Medical College of the London Hospital, said he was employed in making the analyses for the *Lancet*, and had been engaged for fourteen years previous to that time in similar

investigation for the work of Dr. Pereira on *Materia Medica*. He considered adulteration in all substances was most extensive. These adulterations were of various kinds—viz., "accidental," including such instances as "insects in flour," copper in jams and jellies, in consequence of the acid of the fruits acting upon the copper vessels. Some fraudulent adulterations were for the purpose of adding weight, as, for instance, mixing inferior arrow-root with the best quality, starch sugar made from diseased potatoes with the pure sorts, and the mixture of gelatine and isinglass might come under the same head, as well as the addition of water to vinegar and porter. He did not quite agree with the evidence of Mr. Wallington with respect to gelatine and isinglass. There was no distinction chemically, but a great distinction as regarded price, flavour, and action upon the stomach. He could not agree that the only difference was that the gelatine was more pure than isinglass, or that a person would be justified in selling gelatine under the name of isinglass. Chemically they were the same, but physiologically they were quite distinct. To a delicate stomach the difference would be very great. Another class of adulteration was to give a false strength, such as adding sulphuric acid to vinegar. The mixture poor people were in the habit of pouring over the oysters they bought at the street stalls was merely diluted sulphuric acid. "Black jack," or roasted sugar, was employed to give false strength to coffee. A third class of adulteration was for the purpose of improving the appearance of articles. For instance, facing teas, the salts of copper found in pickles and preserved fruits, &c. It was a common trick of the baker to introduce chalk into sour flour to improve it. The adulteration of snuff was very injurious, and possibly hundreds of people had died from its use. With regard to coloured-sugar confectionery it was the most injurious. The colour was almost always produced by the chromate of lead, and twenty-four persons had been brought to the hospital who had been poisoned by eating some of the refuse stock of a confectioner in Petticoat Lane. There was no reason for the use of such poisons, as the foreign confectionery did not contain them, and it was much superior in appearance to English. Another adulteration was where poisonous matters were introduced for the purpose of improving the flavour. The essential oil of almonds was four times as strong as the strongest prussic acid; yet it was constantly used to flavour. With regard to drugs, a great proportion of the adulteration consisted in mixing inert matter with the powdered drugs. It was the custom to send 100 lbs of drugs to be ground, and to expect the same weight returned without regard to waste or evaporation, and in order to make up the required weight, which the druggist would have, the grinder introduced sawdust, or "powder of post." He had examined 200 samples of opium, and rarely found them to contain more than 5 per cent. of morphia, while the crude drug contained 12 to 14 per cent., thus showing a terrible adulteration. A medical man would consequently find the effect of his prescription very different from what he anticipated, and if he went on to increase the dose, and the prescription was taken to another druggist who sold purer drugs, the effect would be most serious.

After enumerating several other drugs, Dr. Letheby said he thought it but right to mention that some of the evidence given before the Committee possibly related to the adulteration of drugs some years ago; lately, owing to the instruction given to chemists by the Pharmaceutical Society, they had much improved. Speaking from his own experience, having examined scores of samples, he could say neither castor nor cod-liver oil were adulterated. As to a remedy for the prevention of adulteration, he would not venture an opinion with respect to food; but, as to drugs, he thought all adulteration might be done away with. It might be left to the Pharmaceutical Society. The great difficulty in the appointment of inspectors was the number that would be required. Such an immense number of things were now brought to the hospital for his examination that it was impossible to find time to attend to them. An analysis required as much as four or five days sometimes.

Mr. Scanlan, Apothecary to the Dublin Apothecaries' Hall, generally confirmed the preceding witness as to the adulteration of the various articles of consumption. He said he had known most of the large drug houses in London for thirty years past, and was convinced they would not lend themselves to any adulteration whatever. He did not agree with Dr. Letheby as to the mode of adulteration by the addition of sawdust to make up for the loss by evaporation and other causes. It was not necessary to do anything of the sort. The principal check to adulteration, he considered, would be the better education of Chemists and Druggists and those who bought those things.

REGULATIONS FOR THE PREPARATION AND SALE OF METHYLATED SPIRIT.

Abstract of the Act, 18 & 19 Vict., c. 37., and the Regulations consequent upon its Provisions.

1. The Act recites that it is expedient, with a view to promote the advancement of the arts and manufactures in the United Kingdom, to allow spirit of wine to be used duty-free in the various processes thereof.

2. In order to effect this, the spirit of wine must be rendered unfit for use as a beverage, and must be sold and used under strict regulations to prevent its perversion from the purposes of the Act.

3. To make it unfit for drinking, it is required that the spirit of wine be not less than 50 per cent. over-proof, and that it be mixed with not less than one ninth of its bulk measure of wood naphtha.

4. This mixture is termed methylated spirit.

5. The mixture may be made on and after the 1st October, 1855, by a distiller or a rectifier, or by a person licensed for the purpose, who will be termed a dealer in methylated spirit.

6. If mixed by a distiller or a licensed dealer in methylated spirit, it may be made from spirit on which the duty has not been paid.

If by a rectifier, drawback of the spirit duty will be allowed.

7. Five hundred gallons of methylated spirit is the least quantity which may be prepared at one time, and the mixture must take place in a vat of sufficient capacity to admit of the spirit being thoroughly stirred up.

8. The duty on a licence to make methylated spirit is £10 10*s*., and the licence is to be renewed annually on the 1st of October.

9. The wood naphtha must be procured direct from a store under the control of the Board, and is to be paid for by the person requiring it.

10. The spirit of wine and naphtha are to be mixed in presence of a supervisor of inland revenue, in a room approved by the Board, and specially entered for the purpose, and in which no other liquid is to be kept.

11. A stock account of methylated spirit is to be kept by the officer, and if a deficiency be found on the balance amounting to two per cent. it is to be charged with duty, and any increase exceeding one per cent. is liable to forfeiture.

Scales, weights, and measures must be provided, and necessary assistance given to the officer in taking account of the stock.

12. The methylated spirit is not to be supplied indiscriminately to the public, but only to such persons as shall undertake to use it for certain purposes in the arts and manufactures, subject to the approval of the Commissioners, and security must be given that it shall be so used.

13. Application must in the first instance be made by letter to the Board, stating the particular purpose to which the spirit is to be applied, the situation of the premises, the quantity likely to be required in the course of a year, and the names of two householders to join the applicant in a bond. The penalty of the bond will be calculated at the rate of 10*s*. for each gallon of the probable quantity that will be required for a year's consumption.

14. The Board will then furnish a book containing forms of requisitions, which must be filled up from time to time for the quantity required, and signed by the applicant. No erasures are permitted; but a mistake may be rectified by a line drawn through the erroneous word or figure.

15. Before a requisition is separated from the counterfoil, both it and the counterfoil are to be filled up; and should a form be accidentally spoiled, it must not be separated, but be preserved for the officer's inspection.

16. Methylated spirit shall not be sent out, except in vessels containing at least ten gallons each, and accompanied by a permit, and shall not be sold to any person, except such as produce a requisition for it upon a form furnished by the Commissioners, properly filled up, and signed by the applicant; and on which there shall be a certificate, signed by an officer of Excise, to the effect that the party making the application is authorized by the Board to receive such spirit. The request for a permit must be made on the back of such requisition, and may be for a less, but not for a greater quantity than has been specified in that document. And if any methylated spirit be delivered to any person, although a proper requisition may be produced for the same, after it shall have been intimated in writing to the seller

thereof that the Commissioners have withdrawn from the purchaser their authority to receive methylated spirit, all spirit so delivered shall be charged with duty.

17. Vessels in which methylated spirit is kept or removed must be legibly painted, branded, or labelled with the words "Methylated Spirit."

18. Any methylated spirit found in the possession of a person not authorized to receive it, or on the premises of a distiller, rectifier, or dealer, otherwise than in a place specially entered for keeping it, is forfeited, and a penalty is incurred. And no person can legally sell methylated spirit except those authorized to make it.

19. Any officer of Inland Revenue is to be permitted at any hour in the daytime to inspect the premises where methylated spirit is used.

20. On the officer's request the book of requisitions, and all permits received with the methylated spirit, are to be delivered to him, and if a permit is not produced to correspond with any filled up counterfoil, the spirit duty must be paid on the quantity entered in the counterpart of the missing permit.

21. The Board may withdraw the privilege of making or obtaining methylated spirit from any party tampering with or misappropriating any document.

22. An article known in the varnish trade as "Finish," and used by French polishers, may be sold by persons authorized to receive methylated spirit, if it contained dissolved therein 3oz. of shell lac in every gallon.

23. *Penalties, &c.*

For a maker keeping methylated spirit, except in an entered room	£100 and forfeiture
For a person other than a maker or authorized receiver, having methylated spirit in his possession	£100 and forfeiture
For any increase beyond 1 per cent. in maker's stock	Forfeiture
For illegal delivery or removal	£50 and forfeiture
For detaching blank requisition or counterfoil	£50
For an authorized receiver interfering with the officer's inspection, &c.	£50

And former enactments as to permits and certificates apply to documents used for methylated spirit.

SUPPLY OF NAPHTHA.

24. In order to ensure the use of a proper quality of naphtha, the Board will undertake, in the first instance, to supply it from a general store in London.

25. The store will be open every day (except Sundays and Excise holidays) between the hours of 9 A.M., and 4 P.M.

26. The collector of London East Collection, Tower Hill, will receive payment for such quantities of naphtha as may from time to time be required, and no naphtha will be delivered except upon the production of the collector's receipt.

27. Purchasers residing at a distance from London may remit money on account of naphtha to the collector, through the bank or otherwise; and the receipt will either be sent to them by post, or forwarded to the storekeeper, in order to the naphtha being delivered as they may direct.

28. The naphtha will be delivered at the store to persons producing orders, or it will be sent by public conveyance to any address endorsed on the order by the purchaser; but after leaving the store it will be at his risk, and he will also be responsible for the charges incurred in such removal. Fifty gallons is the smallest quantity that will be delivered, and the casks or other vessels employed must be provided by the purchasers, and made secure to the satisfaction of the storekeeper.

29. Casks which have been spiled or plugged will not be approved, and only one orifice will be allowed, which shall be secured by such device as the Commissioners may direct; and these casks or vessels, when containing naphtha, are not to be opened in any manner or the device interfered with, until they shall be examined by the supervisor who attends to see the naphtha mixed with spirit of wine.

30. In order that the device for securing the orifice of such vessels may be properly affixed, two metal knobs of sufficient strength must be securely riveted to the cask or vessel, on opposite sides of, and not more than one inch and a half from, the edge of the orifice or bung-hole, and through the head of those knobs a hole of at least one eighth of an inch in diameter must be made close to the surface of the vessel. The owner of the vessel must provide and maintain these fastenings in good repair.

31. A leaden seal will be placed over the bung attached to the knobs by copper

wire. When the cask is opened in the mixing warehouse the seal is not to be interfered with; and the wires at one side only are to be cut, so that the seal may remain attached to the cask until it is returned to the store for a further supply of naphtha.

32. The whole of the naphtha contained in any one cask, when it has been opened for mixing, must be used at the time, although the quantity may exceed the required proportion.

THE CHEMICAL ESTABLISHMENT OF THE EXCISE.

On August 22nd a return was issued, which shows that the total cost of the chemical establishment of the Excise department, including the salaries of the different officers, from the 5th of January, 1854, to 5th January, 1855, was £8677 8*s.* 9*d.*; and the total number of officers educated in the same period was 77, at an average expense of £96 1*s.*; and the moneys paid to independent chemists, during the same period, amounted to £5200 16*s.* 10*d.*—*Express.*

POISONING BY NITRATE OF POTASSA.

BY JOHN SNOWDEN, M.D.

A German, who spoke English imperfectly, went into a store and asked for "bitter salt," meaning sulphate of magnesia. The attendant supposed he meant saltpetre, and gave him half a pound. The man took three ounces and a half at one dose. His bowels were opened three times within three or four hours. He complained of a slight sense of heat in the epigastrium, and drank a good deal of water. About five hours after having taken the saltpetre, he suddenly fell out of his chair and died. The marked peculiarity in this case is the absence of the painful symptoms which usually follow the ingestion of irritant poisons; and the question arises, how was death produced? Certainly not by inflammation of the stomach, for he complained of nothing but a slight sense of heat in the stomach. The poison must have acted by destroying the vitality of the blood. There was no post-mortem. The rigor mortis was very imperfect, the lips of almost a natural pink hue, and the appearance of the countenance so life-like, that some persons doubted the propriety of interment on the third day.—*New Jersey Medical Reporter*, and *Dublin Medical Press.*

CASE OF SUSPECTED SLOW POISONING.

On Monday, July 30, Joseph Smith Wooler, described as an Esquire, was charged before a bench of magistrates in Darlington with the murder of his wife, by slow poisoning, at Great Burdon, in the month of June last. The information was laid by Mr. Brecknell, a brother of the deceased lady.

Mr. Davison, of the Northern Circuit, conducted the prosecution; and *Mr. Marshall*, of Durham (assisted by Drs. Robinson and Rayne, of Newcastle), was for the defence.

Mr. Davison opened the case with a brief recital of the facts, as brought out at the coroner's inquisition, at which an open verdict was returned. His case was—that Mrs. Wooler (aged forty-six) died from chronic poisoning; that the poison could only have been administered in such a slow, cautious way by some one well acquainted with its properties and effects; that Mr. Wooler administered medicines and nearly all the injections; that he had a knowledge of medicines; that Fowler's solution of arsenic (the precise poison to produce the symptoms observed) and a number of other still more deadly poisons had been seen in the house by the medical men; and that at the inquest most of them (including Fowler's solution) could not be found; and upon this he asked for a remand, his instructions being that other matters most material to this inquiry were now being brought to light.

Mr. Marshall had no objection to a remand without examining a single witness. His client courted inquiry.

The following are the principal facts:—Deceased was attended in her illness by Drs. Jackson, Hazlewood, and Henzell; the two latter were called in at a later stage of the illness. She was taken ill in May, and after attending for two or three weeks, Dr. Jackson, from the unusual symptoms, began to suspect she was under the influence of small doses of arsenic, which he declared was never contained in any of the medicines he had supplied. On the 7th of June, Mr. Wooler expressed dissatisfaction

with Dr. Jackson, and in consequence the two latter medical gentlemen attended also. Each entertained suspicions of slow poisoning, but did not communicate the same to each other until the 19th of June, when it was agreed that an antidote should be administered. Subsequently, some of the vomited and other matters were tested by Mr. Henzell; acting under the advice of Dr. Christison, their suspicions were not communicated to the family. Mrs. Wooler died on the 27th of June. Death was preceded by tetanic spasms, which fully confirmed the medical attendants in their opinion that the deceased had been slowly poisoned with arsenic. The *post-mortem* examination disclosed extensive ulceration of the intestines; but, in the opinion of Dr. Jackson, did not account for death. Dr. Richardson received a portion of liver, kidneys, and stomach for analysis, in which he detected arsenic.

Mr. T. B. Teesdale and *Mr. J. T. Abbott*, chemists, both of Darlington, deposed that they had supplied medicines for Mrs. Wooler, but in no case had they supplied any mineral poison.

An enema syringe, borrowed of Mr. J. R. Fotheringill by Mr. Wooler, and returned a day or two after the death of Mrs. Wooler, was found to contain arsenic.

Ann Taylor, in the service of Mr. Wooler, deposed that the medicine she got from Dr. Jackson for Mrs. Wooler produced vomiting when a dose was given by Mr. Wooler, which was not the case when given by Dr. Jackson; and that when Mr. Wooler gave a dose to the patient, he put something into it. Witness stated that on the arrival of the medical certificate stating that Mrs. Wooler died of poison, she gathered up the medicine bottles and put them into her box. After some hesitation, could not tell who told her, or why she did it.

The case was then remanded till Saturday, August 11, when other witnesses were examined; the chief fact elicited being, that the urine sent by Mr. Wooler to Dr. Jackson for analysis was essentially different from that which the medical attendants had brought away either before or afterwards. A further remand then took place till August 17, when the prisoner was formally remanded until August 24, when Dr. Taylor detailed his analysis, which proved the presence of arsenic; after which the Bench unanimously decided that the case should go for trial.

POISONING WITH LEAD.

(*Before Mr. Justice Crompton.*)

STEVENS *v.* BARWELL AND ANOTHER.

(S. J.)—Counsel for the plaintiff—Mr. Barstow, Mr. Serjeant Kinglake, and Mr. Collier; for the defendants—Mr. Smith, Mr. Karslake, and Mr. Gill.

Serjeant Kinglake, in stating the case for plaintiff, said he was the owner of a freehold estate at Charterhouse, a farm of value, which had been occupied by the plaintiff himself for some eighteen years. The grievance of which he complained was an injury done by certain lead works, made up by the defendant. The plaintiff had experienced the greatest possible damage on his farm, and especially upon the stock upon it. It was a dairy farm. Plaintiff kept from thirty to forty cows, and also a number of colts; he likewise had a farm at Cheddar. The defendant was the Chairman of what was called the Mendip Mining Company, and Rodwell was its manager. The Company had been established about ten years. They had been for some time getting permission to gather slag, which contained lead ore, and in which the district seemed to have abounded in the time of the Romans, who, in their assiduity to dig it up, had scattered the refuse about the district. This slag when taken up was subjected to blasting furnaces, and for the purpose of accomplishing these ends, the company had set up works. The law of the country was, that if a person sets up a factory, or a furnace, or any work of that kind for his own advantage or good, he must take care that in the use of it he did not do any injury to his neighbour. Now the defendants, for the purpose above stated, had erected furnaces at a place called Ubley, of three or four different classes and descriptions. Three of them were reverberation or calcining furnaces, and the other was a blasting furnace. Charterhouse farm, which the plaintiff occupied, was situated near the spot on which these works were erected, and between it and the furnaces the plaintiff's brother kept a small farm. In the early part of April, it was found that a very large quantity of smoke issued from the chimneys of the furnaces in question, and shortly after the plaintiff's brother began to find that his stock suffered, and rather than get entangled he gave up his farm. Mr. Barwell became tenant of that and also of another large farm near. At that time they made some alteration in the chimney, and made it of a much greater height, the effect of which was that the

plaintiff's lands began to suffer. In 1851 plaintiff found the young animals of his stock dying—it could be clearly shown by the venom on the grass on the surface of the land. The plaintiff lost, from 1851 down to Midsummer, 1853, four cows, forty-eight lambs, and six colts. He (the learned counsel) would prove they were poisoned, and poisoned by lead. He would show that Mr. Herapath had found lead in the animals, in the hay, and on the hedges, and he had taken weeds from the farm coated with the sulphate of lead. It had been found even in the milk after it had passed through the cow. It didn't affect vegetation in the slightest degree—it only affected animal life. It was not soluble; where it fell there it must lay. It was not one season, or he was told it was not ten; it must be many a long year before the land would be restored to its former condition.

Several witnesses were then called to prove the injury to the stock.

The case was resumed on Monday, when the evidence of other witnesses to the same effect was taken.

Mr. William Herapath, analytical chemist, was then called. He knew Mr. Barwell, the defendant. Called on him in February last, when Mr. Barwell told him that he was the Chairman of the Mendip Mining Company, that the farmers had complained of the works as being injurious to their cattle, and wished witness to undertake the management of the case for the company. Mr. Batt brought him the stomach of a colt in the year 1853, which had some hay or grass in it; he found no lead in the stomach or liver, but some in the linings, and more in the linings of the stomach; the greater part was oxide of lead; he also produced some lead from the lungs, but not enough to bring to the court; after that he visited the Charterhouse farm, and saw the dead part of the stock; there was the carcase of a lamb and pig hanging up in the house; the lungs of each were greatly affected; in both instances they had great patches upon them of a blackish colour, they did not look like ordinary inflammation nor suppuration; there were two more dead lambs in the stable; witness had them opened, and their lungs presented the same peculiar appearance, and a bluish streak round the gums; the pig's kidneys were quite bare of fat. Whilst there, another lamb was brought in in nearly a dying state; its limbs seemed paralysed, and another in a basket which could not stand; opened the lamb with the blue gums; there were some black patches on the lungs, and on some of the second a darkish matter; took some of it out, and found lead in it. Mr. Stevens showed him some weeds, of which he took a part home and obtained lead from them, which he now produced; went out further upon the farm and took a small quantity of hay, to endeavour to try it at home, but afterwards found it was too small for such a purpose, that he required a larger cut to be sent; he was then anxious to have some of the milk from the ewe that had suckled the lamb which died; had it milked in his presence, and took about six ounces from it, and found some lead in that; he then went to the field in the extreme north of the farm and there saw a cow milked; took the milk home, and found lead in that also. On the 6th of March after, Welstead brought him a cut of hay, and from it he produced the lead shown to the court; some time after, Welstead brought him the head of a lamb, the lungs of a calf, and a bundle of sticks from the farm; they each contained lead, viz., oxide of lead, carbonate of lead, and sulphate of lead; on 21st May, witness went again, and saw Dr. Taylor and Professor Brande; they were on the part of the company that time; their attention was directed to two waters there, one was a running brook, the other a pool in front of Stevens's house; witness took samples of both these waters, but found no lead in either of them; there was slag in the water, and in that there was lead; thinks, from all the characteristic symptoms, and from finding lead in all of the animals, that their death was occasioned by lead poison, which may have been caught from the atmosphere. This closed his examination.

The jury here inquired how long Mr. Smith would take to cross-examine Mr. Herapath, and upon being informed at least one hour, wished the Court to adjourn until the following day, which his Lordship acquiesced in, it being seven o'clock.

Tuesday.

The Court was opened at nine o'clock.

Mr. Smith proceeded at once to cross-examine Mr. Herapath at great length, but could not at all shake his testimony, his answers being perfectly clear and straightforward. The learned counsel had the assistance of Professor Brande to prompt him in his questions upon Chemistry.

Mr. Smith then addressed the jury for the defendants for a considerable time, averring that he should prove that the land on that farm was of a poisonous nature,

and had been for centuries, and that the smelting works had nothing whatever to do with it.

Having concluded his speech, the Court adjourned for ten minutes, and upon its reassembling, Serjeant Kinglake addressed the judge, and said the counsel had come to an arrangement, which, he believed, would be as satisfactory to all parties as if a verdict had been given either way; here it was not to have ended, and there would be no end to the litigation. The arrangement was to withdraw a juror, subject to a rule of Court.

The real termination of this case, as far as we could learn, is, that the plaintiff will be compensated for all his loss since 1853, and the defendant will purchase the farm.—*Wells Journal.*

REVIEW.

MEDICINES: THEIR USES AND MODE OF ADMINISTRATION; *including a Complete Conspectus of the Three British Pharmacopœias, an Account of all the New Remedies, and an Appendix of Formulæ.* By J. MOORE NELIGAN, M.D. Edin., M.R.I.A. Fourth Edition. Dublin: Fannin and Co. 1854.

WE have favourably noticed this work on the appearance of previous editions. It has been now somewhat enlarged, and, we think, improved, by the introduction of the formulæ in full of the three British Pharmacopœias. The work, although better suited for medical practitioners than pharmaceutists, contains, nevertheless, much matter that will be found useful to the latter. It does not pretend to treat of the natural or commercial history of drugs, but of the properties and applications of the substances used in medicine. The Materia Medica is classified according to the therapeutic action of the substances described. This arrangement necessitates the repetition of the notice of some medicines, which produce different effects, but it no doubt has an advantage in some respects. In treating of each class of medicines, antacids, anthelmintics, antispasmodics, astringents, cathartics, &c., the general mode of action of the medicines comprised in the class is first described. Thus, under the head of ANTACIDS, we find:—

"Antacids may be defined in general terms, to be medicines which correct acidity by combining chemically with any free acid that may exist in the stomach or digestive organs, and neutralizing it. Their action is manifestly only temporary and palliative, as they do not correct that peculiar state of the digestive organs which favours the formation of acid; their protracted use, indeed, produces a precisely similar tendency in the alimentary canal, and few individuals can bear the continued use of free or carbonated alkalies, a state of general anemia, usually attended with oxalic acid deposits in the urine, and symptoms somewhat analogous to those of scurvy, being caused thereby. Antacids should, therefore, be prescribed in combination with *vegetable tonics;* and in no case should their administration be long persisted in without occasional interruptions. Besides their merely chemical action, alkaline remedies aid the digestion, and thereby promote the assimilation of fatty matters, thus resembling to a certain extent the action of the bile and pancreatic juice; they are consequently indicated when there is a deficiency of these secretions. When their use has been continued for some time, the fibrine of the blood becomes diminished in quantity; and with the view of producing this effect, alkalies are sometimes employed in acute inflammations." * *

After describing the general mode of action of a particular class of medicines, the medicines themselves are described, their preparation (when they have undergone such), their physical properties, chemical properties, adulterations, therapeutical effects (more specifically described), their doses, mode of administration, and incompatibles. Not merely the substances comprised in the Pharmacopœias, but all the substances commonly used in medicine in this country, are included in the work. The descriptions are not long, but they are very explicit, and all redundant matter being avoided, the whole is contained in 600 octavo pages.

BOOKS RECEIVED.

MEDICAL LOGIC. By F. OESTERLEN, M.D. Translated by G. WHITLEY, M.D. London: Printed for the Sydenham Society. 1855.

CATALOGUE OF CONTRIBUTIONS transmitted from British Guiana to the Paris Universal Exhibition of 1855. Printed for the Guiana Executive Committee, Georgetown, Demerara, 1855. From Mr. R. J. Knowles, of Demerara.

TO CORRESPONDENTS.

A. Z. (Walton).—*Tinctura Aurantii.* See the Pharmacopœia. (*Omitted last Month.*)

I. H. F. (Yarmouth).—Sulphuric acid may be deprived of nitrous acid by heating it with a small quantity of sugar (about 10 or 15 grains to eight fluid ounces) at a temperature not quite sufficient to boil the acid, till the dark colour at first produced has disappeared.

Alpha (Stafford).—*Iodide of Manganese.* A solution of manganous carbonate in aqueous hydriodic acid, leaves a white crystalline mass, having a somewhat styptic taste. When kept from contact of air it may be fused without decomposition ; but on the admission of air it is resolved into vapour of iodine and manganous oxide.—(Lassaigne.) *Gmelin.*

J. C. (Walworth).—The quantity of gallic acid in the formula sent is too large for solution ; it should be rubbed in a mortar to a fine powder.

J. S. (Newport, Salop).—*Quinine wine*, made according to Dr. Collier's formula, vol. vi., p. 226, *the materials being good*, is not turbid.

Enquirer (Glasgow) is not safe unless he has evidence to prove that the spirit was sold for medicinal use.

J. R. R. (Bayswater).—The pills should be made quickly, and with the addition of a small quantity of tragacanth.

A Registered Apprentice (Canterbury).—(1.) The injection should not be filtered.—(2.) Rub the yolk of an egg in a mortar with a little of the rose water, then add very gradually the turpentine, lastly add the acetic acid.

A Member (Stafford).—(1.) *Hyposulphite of potash* may be made by boiling sulphite of potash with sulphur ; or by passing sulphurous acid gas through solution of liver of sulphur, till the liquid becomes colourless ; it is then filtered and evaporated.—*Gmelin.*

L. P. B. (Lincoln).—(1.) *Cod-liver oil and quinine.* Vol. xiv., p. 427.—(2.) In two or three months probably.—(3.) Pure protosulphate of iron.

A. V.—(1.) Yes—price 7*s.* 6*d.*—(2.) Through any bookseller.

Querist (Plymouth).—With mucilage and syrup, q.s., and ordinary tact in manipulation.

Omega (Tewkesbury).—*Druggists show colours.* Vol. iii., pp. 94, 143, 192, 341. See also Beasley's *Druggist's Receipt Book.*

H. H. (Edinburgh).—*Hair-dye.* If the hydrosulphuret of ammonia is objectionable, use litharge and quick lime.

P. J.—(1.) The Journal of the Chemical Society is published by Baillière, Regent Street.—(2.) Through any bookseller.

Chemicus (Exeter).—We never saw salprunella plum colour.

Hair-dye.—℞ Hydrosulphuret of ammonia ℥i.
Solution of potash ℥iij.
Distilled water ℥i. Mix, and label "Solution No. 1."
℞ Nitrate of silver ℥i.
Distilled water ℥ij. Mix, and label "Solution No. 2."—*Gray's Supplement* (Redwood).

W. W. (A Member) has answered his question himself; but the subject might be amplified to any extent, if it were necessary to repeat what has been published very often in this Journal. Vol. xiv., p. 105, 293, 337, 385, and all the previous volumes.

A Correspondent (Manchester) repeats his complaint against our remarks on the impropriety and impolicy of Chemists practising as Apothecaries. Being Anonymous we need not answer in detail, but we may observe that his fears are groundless; and that if Chemists should ever be restricted more than they are now, it will be the fault of persons like himself, who by abusing a privilege furnish an argument against its continuance. Those who act discreetly in the exercise of a discretionary power are most likely to retain it.

Erratum.—In our last, page 89, line 29, *for* carbonic acid *read* carbonate of soda.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XV.—No. IV.—OCTOBER 1st, 1855.

PHARMACEUTICAL STUDENTS AND THEIR STUDIES.

The Student's number of the *Lancet* contains a tabular list of the Medical Schools in the metropolis and in other parts of the United Kingdom, with additional information respecting the regulations of the several institutions, and an excellent practical Address to Students, from which we quote the following paragraph :—

"One of the difficulties of the Student lies in the very perfection to which every collateral branch of our art has arrived. Each scientific department might engage the time and energies of a life ; each individual organ with its own special group of diseases, might exhaust the resources of an ordinary mind, and still the boundary enlarges, and each year displays fresh scientific ground to be travelled over. The *embarras de richesses* is a constant and an increasing difficulty to the Student. Each professor sets forth his own subject as especially deserving attention. This is in truth a serious matter, and one well deserving consideration. The time allotted to acquiring a diploma is very limited ; the normal capacity for taking in facts and mastering science has its distinct boundaries. This is a matter as evident as the simplest mathematical proposition. The high pressure system either displaces one idea by another, or it may confuse all. It becomes of paramount importance that the Teacher and the Student should give this subject grave consideration, and should so organize labour, and so apportion subjects—should so weigh the recipient power against the material to be received—as to attain the highest result consistent with the nature of the subject and the capacity of the learner."

The number of medical schools of which the particulars are given, are : In the metropolis, thirteen ; in other parts of the United Kingdom, twelve, besides a few minor or special establishments. The entire list of the courses of lectures comprises twenty-three subjects, of which eight may be classed under the general head of Anatomy and Surgery, seven under that of Medicine, six comprising Pharmacy and the collateral sciences, and one (logic) required by the army medical board, and having reference to general mental training. The subdivisions of the several subjects not being the same in all the schools, the tabular arrangement in the *Lancet* enables the Student to make his selection according to the line of practice he intends to follow. The supplementary Student's number (Sept. 22) contains a table arranged according to the successive hours of the day during the winter and summer sessions, showing at a glance on what day and hour, by whom, and on what subject, a lecture is delivered.

Such is a very brief outline of the nature and extent of the education which modern science has placed at the disposal of the Medical Student. The cost of attendance of the entire courses at any one school is about fifty guineas, exclusive of hospital practice, which increases the amount to nearly £100.

Let us contrast this curriculum with that which is provided for the Pharmaceutical Chemist. We require no tabular arrangement to indicate the courses of lectures and the hours of the day during which each is delivered for the express instruction of Students in Pharmacy. The education at the School in Bloomsbury Square comprises a course of lectures on Chemistry and Pharmacy, and a course on Botany and the natural history of drugs, to which Members and Associates of the Society are admitted without fee ; and practical instruction in the laboratory, for which the fee for a session is thirty guineas. A few lectures, scarcely to be called a course, are delivered in Edinburgh, Liverpool, and Manchester, not with any pretensions to affording a qualification, but as an inducement to young men to take the first step, and with a view of directing them in the course of private study which they ought to pursue.

Even this instalment — diminutive as it appears when compared with the ample provision for the requirements of the Medical Student—is but a modern in-

novation introduced by those who have in their own experience felt the want of such advantages, and who desire that their successors shall possess increased facilities for raising the standard of qualification in their profession. This reformation must be a work of time. A generation will pass away during the period of transition, and it is only the next and succeeding generations who will realize to the full extent the benefit of the improvement. The medical profession was not always provided with the complete and efficient means of education now to be found in the Medical Schools, which have undergone an entire revolution within a few years. We again quote from the *Lancet*:—

"Let the physician or surgeon compare the education of a professional aspirant now with that of which it consisted forty years ago, or before the passing of the Apothecaries Act, that great landmark of medical advancement, and he will find cause enough for congratulating himself that he too is one of a body so distinguished as ours by varied and solid acquirements. There was a time when a little anatomy, physiology, and chemistry, some dissensions and a routine attention for a period to medical and surgical practice in some public hospital, together with what learning he might have picked up during the drudgery of a long apprenticeship, were deemed sufficient to qualify a man to become a fully fledged surgeon. Now, in addition to the subjects named being thoroughly treated and taught in a comprehensive, masterly, and philosophic manner, and the facts to be learned at the bedside being pointed out and studied with scrupulous exactness, Materia Medica, Botany, Midwifery, Medical Jurisprudence, and Practical Chemistry inculcated as sciences should be for portions of the imperative requirements of examining boards. Instruction in the use of stethoscope, the microscope, and the test tube, are deemed, also, necessary to complete a medical education. Comparative and morbid Anatomy, Pathology, Histology, and Natural Philosophy, are recognized branches of the same. Special parts of Surgery—ophthalmic, aural, dental, &c.—find their appropriate teachers. The art of reasoning is absolutely required by one of our public boards; and in our medical colleges a knowledge of the modern as well as of the dead languages is deemed requisite.

So much for the gradual advancement of the programme of Medical education from what it was to the degree of perfection at which it has arrived. Let us again compare this progress with that of the Pharmaceutical department. Twenty years ago no programme of education was recognized as necessary or desirable. The form of an apprenticeship, with the usual work behind the counter, was considered sufficient. Now our metropolitan School of Pharmacy comprises in its curriculum two courses of lectures with laboratory instruction. A more complete programme, in which the subjects were divided into four courses, each having its professor, was tried soon after the School was founded, but the Pharmaceutical Students were not ripe for the change: they did not appreciate the advantages offered, and the attendance was not such as to encourage or justify a continuance of the then existing arrangements. Accordingly, it was found expedient to consolidate the lectures into two courses, and to make a similar reduction in the staff of professors. Thus it would appear that while thirteen regular medical schools are maintained in the metropolis, and while some of them realize large annual returns from the fees paid by students, one metropolitan school of Pharmacy, in which the lectures are free, is sufficient to accommodate all the aspirants to a qualification in that branch of the profession. There is, however, a fallacy in this view of the case, for it cannot be supposed that the number of Pharmaceutical students who attend the school is a correct index of the number who enter the business. In the Medical profession, every student is compelled by law to go through a prescribed course of education at a medical school. In the Pharmaceutical profession it is not so. Those who desire to join that profession as recognized by law are compelled to pass the examination, but they may qualify themselves in any manner they think proper. If found incompetent, they may have reason to regret the neglect of the means of instruction provided for them, but their fate is in their own hands, and they will find their level sooner or later. Herein consists the respon-

sibility of the Pharmaceutical student. He is not, like the Medical student, driven through a fixed course of study, and called upon to produce evidence of regular attendance at his class; he requires the same amount of studious perseverance to ensure success in his profession; but he is a free agent; and being unshackled by scholastic rules, and left to his own discretion, the credit of success or the responsibility of failure must rest with himself.

THE EXHIBITION OF THE PRODUCTS OF INDUSTRY OF ALL NATIONS—PARIS.

For many years, periodical exhibitions of the productions of French industry have taken place in Paris. The example of Great Britain in 1851 was not lost upon our neighbours, and we now have for the first time in Paris an exhibition comprising, or intended to comprise and represent the products of the industry of all nations. The unsettled state of affairs in the East at the present time, has caused a *hiatus* in the competition which did not exist in 1851, and it cannot be doubted that the paralyzing influence of the war has in some degree caused a depressing effect by distracting the public mind, and diminishing the resources of many exhibitors. Notwithstanding this unfavourable circumstance, the exhibition affords satisfactory evidence of the progress of industry, the arts and manufactures, and the collection of materials is so extensive and various, that it would be useless to attempt even a general description.

The building originally designed and constructed as a permanent erection having been found insufficient, a temporary structure, termed the *Annexe*, was added, since which the entire edifice is considerably larger than the Crystal Palace of Hyde Park, from which, moreover, it differs in form and arrangement.

The French empire, including Algeria and the French colonies, has furnished a preponderance of exhibitors, the number in the catalogue being 10,691, while the number from the other portions of the world is only 10,148, of whom 1589 are from the United Kingdom of Great Britain and Ireland, and 985 from the British colonies.

In a collection so extensive and varied, a large proportion of the objects are connected directly or indirectly with science, and among these there are many which are attractive to the eye, and possess general as well as special claims to attention. But we pass over these prominent features in the Exhibition, confining our observations to a brief notice of the chemical and pharmaceutical specimens, which, although probably the least attractive to visitors in general, are those chiefly interesting to our readers. We shall not attempt a complete description even of this small section of the Exhibition, the details of which would be too voluminous. Nor could we have obtained the requisite data, even if this had been desirable, on account of the nature of the arrangement, which makes it extremely difficult to obtain an accurate idea of the entire collection in any branch of industry. In the first place, the productions are arranged according to locality, without reference to classification, and as there are about sixty different nations enumerated in the catalogue, it would be an almost endless task to seek out in each compartment all the specimens in any particular class. Neither are the objects in the respective kingdoms classified; as we find, for example, French chemical and pharmaceutical preparations in several places, and the descriptions in the catalogue are so vague, that it is difficult to identify each, or to ascertain, even after a careful inspection, whether all have been seen.

In the 12th class, which includes Hygiene, Pharmacy, Medicine, &c., the French exhibitors occupy a prominent position. Most of the celebrated Chemical manufacturers of France are exhibitors, and they have contributed rare and splendid specimens of crystallised organic bases, metals, and metallic salts, among which figure conspicuously those which are employed in photography.

It is obvious, however, that many of these specimens do not represent the usual articles of commerce, but are carefully prepared for exhibition. The novelties are few and unimportant, if we except the great attraction of this part of the Exhibition, the metal Aluminum, and the magnificent specimens of Sodium now largely prepared in its manufacture. M. Dorvault exhibits a new substance, called Dulcine, from Madagascar; but we are not informed of any purpose to which it is applicable.

We ought not to pass unnoticed the samples of colours for the use of confectioners, prepared from ingredients which may be eaten with impunity. These colours are sold in the form of soft paste, liquid, and also dry and in cakes. The art of perfumery constitutes an important feature in the French portion of the Exhibition, being unrivalled in variety and in quality. Many exhibitors display gelatine in a great variety of forms, ornamental as well as useful, and the specimens of semolina, tapioca, and other starches and farinaceous foods, are very numerous.

Chemical apparatus is abundant, including several very large platinum stills, with capsules, crucibles, &c., of the same metal. There are also some ingeniously-constructed portable laboratories, pharmaceutical presses, lamps for various purposes, apparatus for producing instantaneous light, with an infinite variety of lucifer and other chemical matches. The variety of gazogenes and vessels for containing aërated waters is remarkable, and among these there are some similar in principle to Mayo's vases, but made of glass instead of earthenware, which is a great improvement. These syphons have almost entirely superseded the ordinary soda-water bottles in Paris, of which latter, however, the Exhibition contains many specimens, as well as a great variety of corks and stoppers, some of which are sold at a very moderate price, including wire fastenings.

British Pharmacy and Chemistry can scarcely be said to be represented in the Exhibition. The number of exhibitors in this department is very small, and several of those who had applied for space sent nothing. Some of our celebrated manufacturers exhibit an assortment of commercial specimens which, in quality, we have no doubt fully sustain their established reputation, although not remarkable for their magnitude, or possessing any unusual peculiarity. There are also some dried medicinal plants in very fine state of preservation, and a few pharmaceutical products.

It was not to be expected that the British Chemists would make so conspicuous a display as they did in the Exhibition of 1851. The risk and trouble of transit to a foreign country, and the prohibitory duties which prevent the introduction of these products into France for sale, were obstacles, and the claim was less imperative. Another circumstance tended to diminish the quantity of the productions from this country. It was stated in the preliminary communications that the exhibition was to be confined to products of industry in the strict sense of the term: that only manufactured articles would be admissible. This excluded the raw materials of the Materia Medica, which in the Exhibition of 1851 formed an interesting and rather bulky portion of the objects contributed. The restriction referred to does not appear to have been observed in other countries, as the contributions from Algeria, Belgium, the West Indies, Sweden, Florence, Austria, Holland, Spain, India, &c., comprise a large assortment of vegetable products—barks, roots, seeds, fruits, and other substances, both in the original state and manufactured.

An exhibition of this kind does not, under any circumstances, furnish an accurate criterion of the advancement of any particular branch of industry in the respective localities represented, as the contribution of specimens is a voluntary act, dependent on the enthusiasm or apathy—as the case may be—of each individual. And while some of the most eminent in their respective callings take an interest in the subject, and think it right to take on themselves a share of the labour and expense of representing the business or profession in which they are engaged, others of probably equal eminence are either too much occupied, or too lukewarm, to give themselves any trouble in the matter.

There are some who consider it best policy to "do good by stealth and blush find it fame." In other words, they are content to produce such fabrics or compounds as shall do themselves good, but do not aspire to fame with regard to their *modus operandi*, or to that kind of notoriety which is gained by such an exhibition. Others, again, take advantage of the opportunity of advertising themselves; and while contributing to an undertaking, the general tendency of which is beneficial to the public, as a stimulus to industry, they obtain the reward of their zeal in the acquirement of a reputation which they did not previously enjoy. In some instances the puffing of goods exhibited is carried to rather a ludicrous extent, and touters, with Argus eyes, assail each visitor with eloquent praises of their wares, accompanied with shop-bills containing the address, where the same may be purchased. Although this practice is not adopted by those who take high ground, and contribute to the Exhibition with a national feeling, or a desire to promote the general advancement of art, science, and industry, it is always found to prevail more or less when competition in the display of goods affords an opportunity.

It must be admitted, notwithstanding the prejudices which in some quarters exist against displays of this kind, that substantial advantage to the public arises from the stimulus thus given to skill and industry, from the communications between manufacturers of different countries and the comparison of their machinery and productions.

Such a collection was, we believe, never before submitted to the public as that which is now exhibited in Paris. We have been informed by gentlemen who have been occupied for many weeks as jurors, that they have not yet completely investigated even the objects in the class to which they have devoted especial attention. The Fine Arts Department, which is in a separate building, comprises a most extensive and interesting collection of pictures from various nations, and places in juxtaposition the works of the respective schools. On this subject it would be out of our province to enlarge, although the painters are indebted to Chemistry for the perfection and permanence of the materials with which they produce their effects.

We have confined our remarks on this occasion to a very brief and superficial notice of the Exhibition, intending, in a future number or numbers, to describe some of the objects exhibited, with such portion of the reports of the jurors as may be likely to interest our readers. As it is not unlikely in so extensive a collection that some interesting objects may have been overlooked, we shall be glad of suggestions respecting chemical apparatus, or other articles which may be worthy of especial notice, with sketches of such as may require to be figured.

THE PATENT MEDICINE LICENCE.

Our readers are reminded that this licence becomes due on the 1st of September, a month being allowed for the payment, after which time it is not safe or proper to sell any patent medicine, unless the licence be renewed.

A correspondent (Mr. Tupholme) has sent us some remarks on the unequal pressure of this tax on the parties to whom it applies. He justly observes that many chemists in the country have a large sale for patent medicines, and pay only 5s. per annum, while the London chemists pay a tax of £2, which in some instances amounts to more than their gross profit on that class of goods in the course of the year. This subject has been repeatedly discussed and argued, and appeals for an equalisation of the tax, or for its repeal, have been made. Mr. Tupholme suggests that a requisition, signed by the London chemists, be presented to the Chancellor of the Exchequer, praying for a reduction of the tax to the uniform amount of 5s.

We fear the present time is not favourable for applications of this nature, and we are inclined to think that the appeal should be made to Parliament instead of to the Chancellor of the Exchequer.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

The Annual Meeting of this Society was held in the Royal Institution on Thursday evening, August 30th, Edward Evans, Esq., the President, in the Chair.

The Secretary announced the presentation to the Library of the following books :—Normandy's *Commercial Handbook of Chemical Analysis*, from Messrs. Clay and Abraham ; Griffin's *Chemical Recreations*, from Mr. W. H. Samuel ; *Pharmacopœia Londinensis*, 1836, from Mr. W. R. Holt; *Proceedings of the Architectural and Archæological Society*, vol. ii., part 1, from the Society. The following books, purchased by the Council since the last meeting, were also laid on the table :—Graham's *Elements of Chemistry*, Hassall on *Food and its Adulterations*, Johnston's *Chemistry of Common Life*, 2 vols., Balfour's *Manual of Botany*, Lindley's *School Botany*, Hooker and Arnott's *British Flora*, coloured plates. A specimen of Lace Bark was presented to the Museum by Mr. W. H. Samuel.

REPORT OF THE COUNCIL.

The following Report of the Council and Treasurer's Financial Statement were then read by the Secretary:—

The Council of the Liverpool Chemists' Association, in presenting their usual Report to the Annual Meeting, have much pleasure in congratulating the Members upon the proceedings of the past year, which they consider highly satisfactory. The number of Members and Associates has increased, and the Pharmaceutical Meetings have exhibited considerable improvement, both in the greater regularity of their occurrence, and in the attendance of Members, though in the latter point there is still great deficiency, and the Council cannot refrain from expressing their strong opinion that a still more numerous attendance at these meetings would add greatly both to their interest and efficiency. The number of meetings held during the past year has been sixteen, and it will be seen from the accompanying list that there has been no falling off either in the high character of the Lecturers, or in the importance of the subjects which they have brought before the Members.

The class for Laboratory Instruction in Practical Pharmacy has been continued under the care of Dr. Edwards. Arrangements were also made with Dr. Nevins and Mr. T. C. Archer for the admission of Members of the Association to their respective courses of lectures on Materia Medica and Botany at the Royal Infirmary Medical School, on very favourable terms. It is matter for regret that so few Members have availed themselves of the advantages thus placed at their disposal. With reference to the Library, the Council are able to report most satisfactorily; during the period embraced in this Report (eleven months) upwards of 202 books have been taken out of the Library, and the extent to which the various works of reference have been used, has also been considerable. This circulation at first sight may not appear very large ; but it must be borne in mind, that at the commencement of the year, the number of volumes in the Library was seventy-seven, and at the present time scarcely exceed 100, a large proportion of which are works of reference, and rarely enter into circulation. The number of different books in actual circulation has been fifty-six, and the greatest use has been made of the valuable standard works belonging to the Library, some of which are rarely to be found on the shelves, being in constant and regular demand. A still further extension of this branch of the Society's operations is highly desirable, and would doubtless be the means of a considerable increase in the number of Members, as it is available to a large body of persons who are unable to attend the Meetings, but who might be induced to join the Association for the sake of participating in the advantages offered by a large and well-selected Library.

The leading feature in the proceedings of the past year has been the commencement of a Museum of Materia Medica and Chemistry, which the Council trust will soon rank high in the list of such collections throughout the kingdom. The formation of a Museum has been constantly kept in view since the establishment of the Association, and contributions of specimens have from time to time been received from various quarters; but, until lately, numerous obstacles have intervened to prevent this important object being fully carried out. In the last Annual Report a hope was expressed that before the close of another year some steps would be taken in this direction, and your Council have great pleasure in stating that this

hope has been realized. In January last application was made to the Committee of the Royal Institution for the requisite space in which to deposit a Museum. This application was received and responded to in the most liberal spirit. The free use of a suitable room was at once granted, and a further resolution passed by the Committee, granting to every Member and Associate of the Society the privilege of free admission to all the valuable collections in the Royal Institution. This additional privilege demands the warmest thanks of every Member of the Association, and its value will be at once appreciated by every one who has had the opportunity of inspecting these collections. The primary object of a suitable place of deposit for the proposed Museum having been secured, immediate steps were taken for its establishment. A Museum Committee was appointed, and a subscription list opened for the purpose of raising the requisite funds ; a series of resolutions on the subject were passed by the Council, and approved of by a general meeting of the Members. A report of this meeting, and of the valuable paper read by Dr. Nevins on the occasion, was printed and extensively circulated, together with a circular containing a copy of the resolutions above referred to, and soliciting donations of specimens, as well as subscriptions, in aid of the Museum fund. To this appeal a liberal response has been made. Many hundred specimens have been promised, and a sum of £70 subscribed, in addition to the grant of £50 made by the Council of the Pharmaceutical Society. The Council being thus placed in a position to commence operations, entered into a contract with Mr. Thos. Fergie for supplying the requisite cases, at a cost of £100 17*s*. These cases are now ready for the reception of specimens, the collection and arrangement of which your Council trust will be vigorously proceeded with by their successors. A balance of less than £15 remains in the hands of the Museum Committee towards defraying the heavy expenses which must necessarily be incurred in fitting up the Museum in the manner best calculated to display the specimens to advantage. This amount will be far from sufficient for the purpose, and your Council appeal with confidence to the friends of Pharmaceutical progress for such support as will enable their successors to complete the Museum in a manner worthy of the Association. They would further solicit the assistance of all those who have it in their power to promote the object in view, by donations of specimens of drugs and chemical preparations.

The Meeting of the British Association in September last was an event of great interest to the public at large, and especially in the scientific circles of the town, and your Council were glad to observe the names of many Members of this Society in the list of those who enrolled themselves as Members of the British Association on that occasion.

During the past year, the "Literary and Scientific Institutions Act" came into operation ; some of its clauses are of the highest importance to such societies as our own, conferring upon them a legal status they did not previously possess ; and in order to place the Association in a position to take advantage of the provisions of the Act, your Council have drawn up a new code of laws, which they submit to the consideration of the Annual Meeting. In accordance with one clause of this Act all bye-laws, for the breach of which a pecuniary penalty is imposed, require the confirmation of three-fifths of the Members present at a Special General Meeting: the bye-laws for the regulation of the Library and Museum come under the operation of this clause, and your Council therefore recommend, that at the conclusion of the business of the Annual Meeting, it be resolved into a Special General Meeting, for the purpose of confirming or rejecting these bye-laws.

The President's annual prize to the best student in the laboratory class has been awarded to Mr. William Henry Samuel ; and the prize offered by Mr. Rawle (late President) for the best essay on "Hydrocyanic Acid" to Mr. R. G. West.

Messrs. Clay, Evans, and Mercer retire from the Council in rotation, but are eligible for re-election. Two additional vacancies are caused by the resignation of Messrs. C. W. Shaw and T. D. Walker.

The Treasurer's financial statement is appended, together with the statement of the Museum fund. From the former it will be seen that there is a balance of nearly £5 to be carried over to the next year.

It was moved by the Secretary, Mr. Walker, and seconded by Dr. Edwards—"That the report and statement of accounts now read be adopted, printed, and circulated amongst the Members."

Moved by Mr. Alpass, seconded by Mr. Shaw—"That the laws and bye-laws of the Association, lists of Members, of donors to the Museum fund, and catalogue of books in the library, be printed and circulated along with the report."

Moved by Mr. Sumner, and seconded by Mr. Rawle—"That the thanks of the Association be given to those gentlemen who have lectured or read papers at the meetings of the Association, and also to the donors to the Library and Museum."

The meeting proceeded to fill up the vacancies in the Council caused by the retirement in rotation of Messrs. Evans, Clay, and Mercer, and the resignation of Messrs. Shaw and Walker. Messrs. Evans, Mercer, J. A. Turner, R. R. Jackson, and H. S. Evans, were elected.

The President's annual laboratory prize was presented to Mr. William Henry Samuel; and Mr. Rawle's prize, for the best essay on Hydrocyanic Acid, to Mr. Robert Gibson West.

A new code of laws drawn up by the Council for the future government of the Association was afterwards discussed, and, with some amendments, adopted.

It was then moved by Mr. Abraham, and seconded by Mr. Alpass—"That the cordial thanks of this meeting be given to the late Secretary, Mr. Thomas D. Walker, for his zealous and able services during the past year."

Mr. Walker thanked the meeting, and moved "That it be now resolved into a special general meeting, for the purpose of taking into consideration the bye-laws for the regulation of the Museum and Library, in accordance with the provisions of the Literary and Scientific Institutions Act."

The President being obliged to leave, Mr. Abraham took the chair, and after a few of the bye-laws had been discussed, their further consideration was adjourned to Thursday, the 13th of September. A vote of thanks having been passed to the Chairman, the meeting separated.

At the adjourned Special General Meeting, held September 13th, Mr. Abraham in the chair, the discussion on the bye-laws was resumed. With some amendments they were all adopted.

The Liverpool Chemists' Association, in Account with R. Sumner, Treasurer.

Session 1854-55.

	£	s.	d.	£	s.	d.
To Printing, Binding Books, &c.				10	3	0
Mrs. Johnson, for Coffee and attendance				8	5	2
Mr. Turner, for delivering Circulars, &c.				11	0	0
Postages and other expenses				1	12	11
Subscription to Cavendish Society				1	1	0
Rent				10	10	0
E. Howell, Books for Library				4	0	0
J. R. Isaac, Plate and Card for admission to Museum				1	4	0
Dr. Edwards, for six Laboratory Students	12	12	0			
Less for Printing	0	12	6			
				11	19	6
To Cash in hand				4	15	0
				£64	10	7

	£	s.	d.	£	s.	d
By Balance from late Treasurer				4	17	11
" Arrears from four Members	2	0	0			
" One Associate	0	5	0			
				2	5	0
" Subscriptions from eighty-two Members	41	10	0			
" Twelve Associates	3	0	0			
	44	10	0			
" To One Member, paid twice	0	10	0			
				44	0	0
" Six Laboratory Students				12	12	0
" Library Fines				0	15	8
				£64	10	7
Cash in hand				£4	15	0

MUSEUM ACCOUNT.

	£	s.	d.
To Thomas Fergie, for Mahogany Cases	100	17	0
" Distributing Circulars	1	10	0
" Sundries	0	1	6
" T. Kaye, Printing	1	0	0
" Fearnall & Co., ditto	1	19	0
" Balance	14	15	0
	£120	2	6

	£	s.	d.	£	s.	d
By Donations, as per list	122	4	6			
" Less Arrears	2	2	0			
				120	2	6
				£120	2	6
Cash in hand				£14	15	0

Examined and found correct, W. H. Fisher, John Oliver, *Auditors.*

MANCHESTER PHARMACEUTICAL ASSOCIATION.

This Association is making satisfactory progress since the amalgamation of the two previously existing societies, and meets with the support of many parties who had previously kept aloof, and withheld their assistance from the efforts made for the improvement of the Pharmaceutical body in the district.

The Committee of the Society being desirous of extending its utility as much as possible, issued an address to the Chemists and Druggists of Manchester and Salford and the neighbourhood, explanatory of the objects of the Association, and stating the educational arrangements for the ensuing session. This was followed by an active canvass by the Committee, the result of which was the acquisition of about 100 Members and Associates, whilst amongst the parties who did not give their support a general feeling in favour of the Society, and an appreciation of the necessity for such an Association, was expressed; and in most cases the refusal was given on the ground of inability to participate in the advantages offered.

The first Evening Meeting of the Society will be held on Friday, Oct. 5th, at eight P.M., on which occasion the Chemists of the neighbourhood, whether Members of the Society or not, are invited to be present.

The lecturer on Chemistry, D. Stone, Esq., will deliver his introductory lecture to the Students on Wednesday, Oct. 10th, at half-past three P.M., and the Committee hope that as many of the Members and Students will be present as are able to attend.

The following is a copy of the address issued by the Committee:—

"*Wellington Chambers, Victoria Street, September 1st*, 1855.

"Sir,—A union having been effected between the Chemists and Druggists' Institute and the Chemists' Conversational Society, the Committee of the united Societies (the Manchester Pharmaceutical Association) earnestly solicit your co-operation and support, to enable them to carry out the objects for which it was instituted.

"The most important of these is to provide for the younger members of the Pharmaceutical body improved means of education in the various branches of scientific knowledge, now so essential in the daily operations of Pharmacy, and without which it will be impossible for them to pass the Examination of the Pharmaceutical Society, which is every year becoming of greater importance.

"Several courses of lectures have already been delivered on Chemistry, Botany, and Materia Medica, which have been well attended. During the ensuing session a course of twenty-five lectures on Chemistry will be delivered at the Society's Rooms, Wellington Chambers, Victoria Street, by Daniel Stone, Esq., Lecturer on Chemistry to the Chatham Street Medical School, on Wednesday afternoons at 3.30, commencing on Wednesday, October 10th. The fee for Students to this course will be 10*s*.

"At the termination of the Chemical lectures, a course of twelve lectures on Practical Pharmacy, more particularly relating to the Pharmacopœia preparations, dispensing, and the daily operations of a Pharmaceutical establishment, will be delivered by some of the Members of the Society, and will be followed by a course of twelve lectures on Botany or Materia Medica, by one of the Professors. The fee to the two courses will be 10*s*.

"Students entering for the entire session will be charged a fee of 15*s*. to the three courses.

"Arrangements have been made with the Professor of Chemistry to give instructions in chemical manipulation and analysis, at his laboratory, on Monday evenings, from six o'clock to eight.

"It is also in contemplation to hold Evening Meetings of the Members in the Rooms of the Society, for the discussion of scientific subjects, and other matters of interest, which will be open to the Assistants and Apprentices of the Members.

"The Committee sincerely hope that you will be able to allow the young men in your employ to avail themselves of the opportunities of instruction now offered, and would feel obliged if you will urge upon them the necessity of doing so, feeling convinced that any sacrifices incurred for this purpose will be amply compensated by the value of the instruction received.

"A deputation from the Committee will wait on you in a few days, when they hope to receive the promise of your support.

"The First Evening Meeting of the session will be held in the Society's Rooms on Friday, October 5th, at eight o'clock, P.M., which you are respectfully invited to attend.

"Your obedient Servant,

"W. WILKINSON, *Hon. Sec.*

"The Members' subscription to the Society is 10*s.* 6*d.* per annum."

ORIGINAL AND EXTRACTED ARTICLES.

PRACTICAL RULES AND RECIPES IN ELECTRO-DEPOSITION.

BY GEORGE GORE, ESQ.

(*Continued from page* 112.)

156. THERE is no rule generally recognized in the trade respecting the most suitable proportion of free cyanide of potassium; some manufacturers use a very large, and others a very small proportion.

157. The amount of free cyanide of potassium in any given quantity of silver solution, may be easily ascertained by the same method as that already described (142) for testing the quality of cyanide of potassium, *i. e.*, by adding a solution of nitrate of silver to it as long as the precipitate formed is all re-dissolved, and noting how much nitrate of silver is used; every 175 parts of crystallized nitrate of silver used indicates 130 parts of free cyanide in that quantity of solution, or about three parts of free cyanide to four parts of nitrate of silver.

158. The amount of silver in any quantity of silver plating solution might be approximately ascertained by adding dilute sulphuric acid to it as long as a precipitate is produced; wash and dry the precipitate, which is cyanide of silver, every 134 parts of which contains 108 parts of silver.

159. The cyanide of silver and potassium depositing solution may be formed by other modifications of the chemical method than the one described (148); for instance, some operators make their solutions by adding either oxide, carbonate, or even chloride of silver, to a solution of cyanide of potassium as long as it is dissolved, and then adding the desired proportion of free cyanide. This modification enables the operator to use caustic potash (133), carbonate of potash, chloride of sodium, or hydrochloric acid (134) in place of cyanide of potassium for precipitating the nitrate of silver, but it still requires the same amount, namely, two equivalents of cyanide of potassium to be used as in the method described (148) because in all such cases (according to the researches of Messrs. Glassford and Napier, *Phil. Mag.*, 1844) the salt of silver is converted into cyanide of silver as it dissolves, and thus it requires one equivalent of cyanide of potassium to convert it, and another to dissolve it, so that no cyanide is saved, and the other ingredients (carbonate of potash, chloride of sodium, &c.) are wasted. This modification has a still greater disadvantage; it introduces salts into the plating solution which are injurious. I have before said (23, 24) that a good depositing solution should dissolve the anode freely, hold abundance of metal in solution, and not act upon common metals to dissolve them, because it is such metals we generally wish to coat; if oxide of silver is added it converts half the cyanide of potassium into caustic potash; if carbonate of silver it converts it into carbonate of potash, and if chloride of silver it converts it into chloride of potassium; each of these substances remains in the solution and diminishes its action upon the dissolving plate, decreases its solvent power for cyanide of silver, makes its particles less mobile, and causes it to act upon the common metals and endanger the adhesion of the deposit, especially if chloride of potassium is present.

160. Cyanide of silver plating solution may be made by the battery process (31) as well as by chemical means, and this process has its own advantages and disadvantages, it is very convenient in making a small quantity of solution, be-

cause it enables it to be made quickly, avoiding the trouble of making nitrate of silver, of precipitation, and of washing, and the attendant risk of loss of materials; but it has the disadvantage of converting a large proportion of the cyanide of potassium into caustic potash by taking its cyanogen to form cyanide of silver and setting the potassium free, which immediately takes oxygen from the water and forms caustic potash, whilst the hydrogen of the water escapes at the cathode, and the potash so formed gradually becomes converted into carbonate of potash by absorption of carbonic acid gas from the atmosphere; neither potash nor carbonate of potash are so injurious in the solution as chloride of potassium, because they act less strongly upon common metals, still they diminish the action of the liquid upon the dissolving plate, reduce its solvent power for cyanide of silver, and make its particles less mobile. Some electro-platers think that the presence of these salts is not injurious, but most consider them highly detrimental.

161. Peculiar phenomena often occur in the electro-deposition of silver upon different metals, and upon the same metals in different forms or in different conditions of surface, for instance, in depositing it upon britannia metal, pewter, tin, or lead, if the articles are washed in water after having been cleaned in the potash liquid and then immersed in the silver solution, the silver deposited upon them will not adhere firmly; but if they are taken direct from the potash liquid and immersed in the silvering vat, the connexion being formed with the battery as they are passing down into the liquid, the deposit will adhere. Again, if two perfectly similar pieces of thin sheet brass are taken, except that one is perforated all over with numerous holes, and both be immersed simultaneously in the same solution to be silvered, and with the same battery power applied to each, the latter, although its amount of surface is reduced by the perforations, will become coated with silver much more slowly than the former:—or if a wire gauze cylinder of a Davy lamp be suspended side by side with a piece of smooth tubing of the same dimensions and composed of the same metal, the latter will become coated much more rapidly than the former:—further, if two pieces of the same metal, iron for instance, each containing exactly the same amount of surface to be coated, but one being in the form of a thin sheet and the other in that of a solid block of metal be used, the former will become coated much more rapidly than the latter; and again, the edges and points of articles whilst coating exhibit a greater tendency to crystalline deposit than the flat parts; this is sometimes manifest in depositing silver upon table forks:—it is the knowledge of these and many other peculiarities met with in practical working, and of the means of overcoming their attendant difficulties, which constitutes the chief difference between the practical operator and the scientific man.

162. Mr. Edmund Tuck took out a patent, June 4, 1842, for improvements in silver electro-plating upon German silver; for plating the common kinds of this alloy he uses sulphate of silver dissolved in a solution of carbonate of ammonia, and for plating the best quality he uses cyanide of silver dissolved in carbonate of ammonia; the solutions are formed by dissolving 70 parts of carbonate of ammonia in distilled water, then adding 156 parts of sulphate of silver, or 134 parts of cyanide of silver, and boiling the liquid until the salt is dissolved; for coating common German silver he adds half-an-ounce of sulphate of silver to 107 grains of bicarbonate of ammonia.

163. A solution composed of acetate of silver 1 part, cyanide of potassium 4 parts, and water 20 parts, conducts very freely and yields a fine white deposit of silver; similar results are also obtained with a solution composed of water 65 parts, aqueous hydrocyanic acid 65 parts, black cyanide of potassium 12 parts, and cyanide of silver 10 parts.

164. A branch of electro-deposition manufacture has been gradually extending termed "solid depositing;" it consists not in coating other metals with copper, silver, or gold, but in making articles wholly of those metals by the electro-process, such for instance as ornamental snuff-boxes, tea-caddies, silver fruit-plates,

dishes, watch and clock faces, and other articles, which have been elaborately chased or engraved, or have complex or undercut ornaments upon them; in such cases the expense of multiplying the articles by electro-deposition is less than that of producing them by the ordinary means of stamping, chasing, and engraving.

165. Mr. Alexander Parkes took out a patent, March 29, 1841, for improvements in solid depositing; he converts one ounce of silver into oxide of silver, and dissolves the oxide in two gallons of water containing sixteen ounces of cyanide of potassium, and uses the resulting liquid for depositing solid articles in silver.

166. For a long time much practical interest was attached to the hoped-for discovery of a means whereby silver might be deposited in a bright condition instead of with its ordinary dead white surface, in order that the labour of burnishing it might be avoided or lessened, and this discovery was at last made under the following circumstances:—Some operators at the works of Messrs. Elkington and Mason were engaged in experiments upon elastic moulds, and whilst coating them with silver in the depositing vat, the deposits taking place upon the various articles in that vat were observed to present very peculiar and unusual appearances, some of them being exceedingly bright in different parts; these appearances were referred to the presence of the elastic moulds, and from the known presence of bisulphide of carbon in the moulds, experiments were tried of adding portions of that liquid to a quantity of plating solution, which finally ended in success, and a patent was taken out by Messrs. Lyons and Millward, March 23, 1847, in which is given the following instructions for producing a bright deposit: "Add to the usual solution of silver in cyanide of potassium bisulphide of carbon, terchloride or other chloride of carbon, sesquichloride or other chloride of sulphur, or the hyposulphite of either potash or soda. The bisulphide of carbon may be used alone or dissolved in sulphuric ether, or any of the hydrocarbons; or it may be used in conjunction with any of the other substances mentioned above, but the patentees prefer using it as follows: Six ounces of bisulphide of carbon are put into a stoppered bottle, and one gallon of the usual plating solution added to it; the mixture is then shaken and set aside for twenty-four hours; two ounces of the resulting solution are then added to twenty gallons of the ordinary plating liquid, and the whole stirred together; this quantity must be added every day on account of the loss by evaporation, but when the mixture has been made several days, less than two ounces may be used at a time; and when hydrocarbons are used a much larger quantity must be added. This proportion gives a bright deposit, but by adding a larger proportion a dead surface may be obtained very different to the ordinary dead surface." The liquid is generally added to the vat in the evening.

167. The above substance is generally employed throughout the trade, although few are licensed to use it; other compounds are also used but to a limited extent, among which are sulphur and collodion. A solution of iodine and gutta percha in chloroform is said to be more permanent in its effect than bisulphide of carbon.

168. Silver deposited in a bright condition is much harder than that deposited in the ordinary dull state, and has more the appearance of fused metal; the bright appearance commences at the upper parts of the articles in about ten or fifteen minutes after their first immersion in the vat and travels downwards, it soon after commences at their lower parts and passes upwards, until the bright portions meet each other. If there are any small holes in the surface of the article, dull vertical streaks will appear above them.

169. A bright solution requires a large quantity and low intensity of battery-power to work it, and the anode in it is generally of a darker colour than that in the ordinary liquid. It is much more difficult to operate with than the ordinary liquid; if it is not worked constantly and uniformly it will lose its power of yielding bright metal; if any one of the articles which

are being plated in it is disturbed or removed from the liquid and replaced, that one will not again receive a bright deposit, and the disturbance of the liquid by removing it will oftentimes cause all the neighbouring ones to lose their brightness; or if too much brightening liquid is added the solution will be considerably injured, indeed many silver solutions have been totally spoiled in this manner.

170. All articles after having been electro-plated with silver are well washed in clean water under a running stream of water until every trace of the depositing liquid is removed, they are then moved about in hot and dry sawdust, and rubbed with it until they are perfectly dry.

171. To ascertain the amount of silver put upon the articles, they are weighed before plating, and again after being taken out of the sawdust. They are then "scratched" (59), and finally finished by burnishing, polishing, &c.

172. Sometimes, for the purpose of ornament, portions of the silver surface are "oxidized." To effect this a hot solution of bichloride of platinum is applied to it, and allowed to dry. The more platinum the solution contains, and the hotter it is, the deeper black does it produce. To produce a brownish tint, a solution of equal parts of sal ammoniac and sulphate of copper in vinegar is applied. A solution of sulphide of potassium (liver of sulphur) is used for the same purpose. To produce a *dead* appearance upon the surface of a plated article, deposit a mere trace of copper upon it in a copper solution, then thoroughly wash it, and deposit a thin film of silver upon this. In each of these cases the parts which are to remain bright must be stopped off with varnish.

173. Many old and worn-out articles formed of "Sheffield plate," in which the outer coating of silver has worn through in places, and expose large portions of the copper base beneath, are sent to be replated. These generally require the portions of silver still remaining upon them to be taken off, and an entirely new coating of silver put upon them. The removal of the silver is termed "stripping." It is done by immersing the article in a quantity of hot sulphuric acid, to which a little nitrate of potash (saltpetre) has been added, and allowing it to remain until all the silver is dissolved from it. The copper will not be much acted upon. The article is then washed, "scratched" (59), and prepared in the usual manner for receiving a deposit.

174. Copper may be removed from silver by boiling it in dilute hydrochloric acid, or by immersing it in a hot solution of perchloride of iron. This solution may be easily formed by dissolving peroxide of iron (*crocus*, jewellers' rouge) in hydrochloric acid; it will remove copper, tin, or lead from either gold or silver, without affecting the latter metals. A solution of chloride of zinc has been used for dissolving copper from silver. Copper may also be completely removed from silver without injuring the latter, by suspending the article to be "stripped" as an anode in a sulphate of copper solution (89), and passing a current of considerable quantity from one pair of Smee's battery through it, until all the copper is dissolved.

175. To test the purity of the silver, M. Runge adopts the following method: Immerse the article in a mixture of 3 parts of chromate of potash, 32 parts of water, and 4 parts of sulphuric acid. The immersed part of the silver quickly assumes a purple colour, and the colour produced is less deep and less lively, in proportion to the amount of alloy contained in it. No other metal besides silver exhibits this colour with this liquid.

176. Occasionally silver solutions get so much out of good working condition, either from the addition of too much "brightening liquid;" from great excess of cyanide of potassium; from excess of cyanide together with the heat of the weather; from the accidental introduction of impurities; from addition of substances intended to improve the condition of the liquid; or from the liquid being improperly made in the first place, that it is impossible to obtain good deposits of metal from them. In such case it is very desirable to recover the

silver contained in the liquid. Supposing the solution to be the usual one, composed of cyanide of silver and cyanide of potassium, the silver may be recovered in the metallic state by the following method:—Evaporate the solution nearly to dryness, powder the resulting salt, mix it with its own weight of a mixture of two parts of common salt and one part of nitrate of potash, and roast it in an iron pan to perfect dryness. Fuze the dried mixture at a bright red heat in a common Dutch pot (earthen crucible), until the silver is collected at the bottom of the vessel in a melted state, then pour it slowly into a large quantity of water. The resulting granules of silver should not be used in making a new plating liquid, because they generally contain copper; but should be exchanged at a silver refiner's for pure silver.

177. The following, relating to the "extraction of gold and silver from exhausted solutions," is translated from a paper by Elsner:—"I have undertaken a series of researches upon this object, and hasten to communicate the results to the public; but before proceeding to the communication, I think it necessary to mention the results of the experiments upon which are based the methods given further on for extracting both the silver and the gold of old cyanide of potassium liquids.

178. "1st.—If we add hydrochloric acid to a solution of silver in cyanide of potassium, until the liquid exhibits an acid reaction, we obtain a white precipitate of chloride of silver, which, when submitted to heat, melts into a yellow mass. If this was cyanide of silver, the application of a red heat would have left a regulus of silver. The addition of the hydrochloric acid precipitates all the silver present in the liquid in the form of chloride of silver.

179. "2nd.—If we evaporate a solution of silver in cyanide of potassium to dryness, and heat the residue to redness until the mass is in a state of quiet fusion (in which state it assumes a brown colour), there remains, when we wash the mass with water, metallic and porous silver. The wash waters, when filtered, still contain a little silver in solution; because if hydrochloric acid is added to them, it produces a precipitate of chloride of silver. In evaporating and calcining a solution of gold in cyanide of potassium the result is the same—we obtain metallic gold. The wash waters, acidulated with hydrochloric acid, give when treated with sulphuretted hydrogen a brown precipitate of sulphide of gold, and with salt of tin a violet precipitate (purple of Cassius), a proof that these liquids still contain a little gold in solution.

180. "3rd.—If we pour upon finely-divided silver (for instance, leaf-silver, or silver precipitated in the porous state by zinc from a solution of silver) a concentrated solution of cyanide of potassium at the ordinary temperature, and shake it frequently, the liquid at the end of a certain time contains silver in solution, as by adding hydrochloric acid to it we produce an abundant precipitate of chloride of silver. The experiment explains why, in the wash waters of the various combinations of gold or of silver with cyanide of potassium, we can still demonstrate the presence of gold and of silver. It is that those waters still contain cyanide of potassium; and it is a fact long recognized, that gold is dissolved by solutions of cyanide of potassium.

181. "4th.—When we add hydrochloric acid or ordinary sulphuric acid to a solution of cyanide of copper and cyanide of potassium, until the liquid exhibits an acid reaction, there results a reddish-white precipitate, which is a cyanide of copper in the anhydrous state. If we well wash the precipitate and boil it in potash lye, protoxide of copper is separated of a beautiful red colour; and if to the filtered alkaline liquid we add a solution of green copperas, we obtain a dirty blue precipitate. A solution of carbonate of soda furnishes the same results, and yields with the copperas the same dirty blue precipitate. If we dissolve the reddish-white precipitate in pure nitric acid, and add to it a solution of nitrate of silver, an abundant white precipitate is produced, which, when washed, dried, and calcined, yields silver in the metallic state, a proof that the precipitate is cyanide of silver.

182. "The reddish-white precipitate is soluble in an excess of hydrochloric acid, in nitric acid, and in aqua regia, it is also soluble in aqueous ammonia, and in a solution of cyanide of potassium.

183. "5th. If we pour hydrochloric acid into a very pure solution of gold in cyanide of potassium, there is slowly formed at ordinary temperatures, and immediately on the application of heat, a yellow precipitate, which is cyanide of gold; the filtered liquid which has given this precipitate, still contains a little gold in solution. In evaporating to dryness, fusing, and filtering afresh, there remains upon the filter the remainder of the gold.

184. "When a solution of silver prepared for silvering articles of bronze or of brass has been employed a certain time for that purpose, the precipitate produced in it by the addition of hydrochloric acid is not pure white but reddish, in consequence of the reddish-white cyanide of copper which is precipitated with it, for we know that those silvering liquids which have been used for some time, contain copper in solution. The same thing occurs with the solutions for gilding, in which we have gilded for a long time articles of silver, copper, bronze, and brass, *i. e.*, the liquid contains after a certain time of service, not only gold, but also silver and copper. This case presents itself especially when we gild articles of silver containing copper (*i. e.*, alloys of silver) in the solution of gold; then, the precipitate of cyanide of gold produced by the addition of hydrochloric acid does not possess its proper pure yellow colour. It has happened to me to observe a precipitate of this kind, which instead of being yellow, was green, and in fact, we have introduced and gilded articles of iron in a solution, and the precipitate contained, besides cyanide of gold, Prussian blue, so as to be demonstrated in an examination, which consisted in boiling the green precipitate in aqua regia, filtering to separate the dirty green residue, evaporating the filtered liquid to dryness, dissolving the dry salt in water acidulated with hydrochloric acid; then the addition of sulphate of iron to this new liquid gave a brown precipitate, and the salts of tin a reddish-brown precipitate. In treating by aqua regia, the cyanide of gold was then decomposed, and converted into chloride of gold.

185. "Based upon the preceding facts we may found several methods for recovering all the silver and gold of old cyanide of potassium solutions. The extraction of these precious metals may be effected either by the wet or by the dry way.

186. "*Extraction of Silver by the Wet Way.*—We add hydrochloric acid until the liquid exhibits a strongly acid reaction. The precipitate of chloride of silver which we thus obtain will be, as we have already said, of a reddish-white colour, because of the cyanide of copper which is precipitated with it, when the solution has been used a long time for silvering objects containing copper. In this precipitation by hydrochloric acid there is hydrocyanic acid gas set free, therefore the operation should not be performed except in a place where there is a good ventilation, or best in the open air. If the precipitate is very red it must be treated with hot hydrochloric acid, which will dissolve the cyanide of copper. The chloride of silver having been washed with water, must be dried, and then fused with potash in a Hessian crucible, coated with borax, in the ordinary manner for obtaining metallic silver.

187. "This method is very simple in its application, and very economical, considering that by the aid of the hydrochloric acid all the silver contained in the solution of cyanide of potassium is precipitated, and that there remains no trace of it in the liquid. But the large quantity of hydrocyanic acid gas which is disengaged is a grievous circumstance and must be taken into serious consideration when we operate upon large quantities of silver solution, and we should take great care that the deleterious vapours of that acid may escape immediately and without danger to the workmen; but when we have taken the proper precautions dictated by prudence, the method in question may be considered as perfectly practical. I also recommend to pour the liquids into very

capacious vessels, because the addition of the acid produces a large amount of froth.

188. "*Extraction of Silver by the Dry Way.*—The solution of cyanide of potassium is evaporated to dryness, the residue fused at a red heat, and the resulting mass when cold is well washed in water. The remainder is the silver in a porous metallic condition. There still remains in the wash waters a little silver, which may be precipitated by addition of hydrochloric acid.

189. "*Extraction of Gold by the Wet Way.*—A solution of gold and cyanide of potassium which has served a long time for gilding articles of silver alloyed with copper, may still contain, as we have already remarked, independently of the gold, both silver and copper, and perhaps iron. In order to obtain these metals we operate in the following manner:—The liquid, the same as with the solution of silver, is acidulated with hydrochloric acid, in which case there is produced as aforesaid a disengagement of hydrocyanic acid gas, which requires that we operate where there is good ventilation. This addition of hydrochloric acid causes a precipitate, which may, according to circumstances, consist of cyanide of gold, cyanide of copper, and chloride of silver. The precipitate, washed and dried, is boiled with aqua regia, which dissolves the gold and copper in the form of metallic chlorides, and leaves the chloride of silver unaffected. The solution containing the gold and the copper is evaporated nearly to dryness to drive off any excess of acid; then dissolved in a small quantity of water, and the gold precipitated from it in the state of a brown powder by the addition of a solution of protosulphate of iron. We reduce the chloride of silver to the metallic state by the known means. The liquid from which we have precipitated the cyanide of gold, &c., by hydrochloric acid may yet contain a little gold in solution. I refer for its treatment to the foregoing (183. "5th).

190. "This method is distinguished by its great simplicity of application, and we may repeat for it all that we have already said respecting the extraction of silver by the wet way (157).

191. "*Extraction of Gold by the Dry Way.*—The solution of cyanide of potassium which contains gold, silver, and copper, is evaporated to dryness; the residue fused at a red heat, cooled and washed (the wash waters still contain a little gold and silver, and this occurs most often when the solution of gold or silver contains a very great excess of cyanide of potassium). The residue after washing consists of gold and silver in a metallic porous state, and carbide of copper resulting from the decomposition of cyanide of copper by the heat. The metallic residue is treated by aqua regia, which forms insoluble chloride of silver, and contains the chlorides of gold and copper in solution. In order to obtain these metals in the metallic state we must proceed in the manner previously indicated (189).

192. "If we operate according to the method of Professor Boettger, *i. e.*, if we fuse the dried residue with its own volume of litharge in a covered crucible, the regulus we obtain in this case consists of gold, silver, and lead. In treating this alloy by nitric acid of specific gravity 1.2, and applying heat, the gold remains in the form of a brown powder, whilst the lead and the silver are dissolved in the acid. This solution after having been diluted with distilled water, may have the silver separated from the lead, by the addition of hydrochloric acid.

193. "These methods of extracting all the silver and gold by the dry way from old solutions of cyanide of potassium present this advantage, that the operator is not incommoded during his working by the disengagement of vapours of hydrocyanic acid, which in these operations are not developed as they are in the processes for the extraction of the metals in the wet way.

194. "After the experiments reported in this note, those persons who are interested in the subject may choose for themselves which of these methods in the circumstances in which they are placed appear to them the most suitable to attain their design.

195. "*Means of recovering Gold or Silver from the Solutions used in electro-*

gilding and silvering, by M. Bolley.—Cyanide of gold dissolved in an excess of cyanide of potassium resists all the means which we have tried in order to separate them; and hydrosulphuric acid, for example, does not produce a precipitate. By the wet way we cannot always precipitate the gold completely, and for that reason MM. Boettger, Hessenberg, Elsner, and others, propose to evaporate the liquid to dryness, mix the residue with its own weight of litharge, fuse the mixture at a strong red heat, then dissolve the lead from the alloy by boiling it a long time with dilute nitric acid, which leaves the gold in the form of a light sponge.

196. "M. Wimmer has more recently proposed to evaporate the solution to dryness in a water-bath, then mix the residue with $1\frac{1}{2}$ times its weight of nitrate of potash, and introduce the mixture by small portions at a time into a Hessian crucible, heated to redness in order to cause explosions, and to continue this until the entire mass is in a state of quiet fusion.

197. "The first of these two processes does not give room for any objection, except the employment of a great heat and the use of nitric acid; the second process is on the contrary disagreeable and very uncertain. We know that saltpetre never explodes with more violence than with cyanide of potassium, and notwithstanding that the inventor of the process advises us not to add more then small portions of the mixture at a time, the explosions are so rapid that they cannot be caused without loss of material.

198. "The following process is applicable on the small scale with a spirit lamp and a crucible of platinum:—Evaporate the solution to dryness, mix the saline mass with its own weight of sal ammoniac, and heat it gently: ammoniacal salts decompose, as we have said, the metallic cyanides, and form cyanide of ammonium, which is itself decomposed by the heat and volatilized, whilst the acid of the ammoniacal salt (or the body which salifies the ammonia) combines with the metals (passed to the state of oxides), which were previously united to the cyanogen. The sal ammoniac then in this case forms chloride of potassium and chloride of gold, and if the salt contains ferrocyanide of potassium, chloride of iron in addition. The chloride of gold is easily decomposed, the chloride of iron is partly decomposed, and leaves oxide of iron in beautiful crystalline spangles. The undecomposed portion of the chloride of iron, like the chloride of potassium, may, after the decomposition is finished (which only requires a low red heat), be washed away by water, leaving the gold in the form of a light coherent mass, and the iron in small spangles, which may be removed by mechanical means.

199. "If we fear that a little of the gold remains mixed with the iron in a pulverulent state, we may dissolve it in hot aqua regia, and precipitate the gold from the resulting solution by adding to it a solution of protosulphate of iron; but this appears superfluous, and I am assured by evaporation of given volumes of the same solution of gold, the evaporation and calcination of the sal ammoniac, and other operations, that we have collected in a sufficiently exact manner all the gold of these solutions.

200. "The same process is applicable to the solution of silver, and independently of the oxide of iron (of the ferrocyanide of potassium) we obtain chloride of silver, which is soluble in aqueous ammonia."

ON A SUPPOSED AËROLITE OR METEORITE FOUND IN THE TRUNK OF AN OLD WILLOW TREE IN THE BATTERSEA FIELDS.

BY SIR RODERICK IMPEY MURCHISON, F.R.S.,
Director-General of the Geological Survey of Great Britain.

In bringing this notice before the Royal Society, it is unnecessary to recite, however briefly, the history of the fall of aërolites or meteorites, as recorded for upwards of three thousand years, though I may be pardoned for reminding my Associates, that the phenomenon was repudiated by the most learned academies of Europe up

to the close of the last century. The merit of having first endeavoured to demonstrate the true character of these extraneous bodies is mainly due to the German Chladni (1794); but his efforts were at first viewed with incredulity. According to Vauquelin and other men of eminence who have reasoned on the phenomena, it was in 1802 only that meteorites obtained a due degree of consideration and something like a definite place in science through the studies of Howard, as shown in his memoir published in the Philosophical Transactions.

Vauquelin, Klaproth, and other distinguished chemists, including Berzelius and Rammelsberg, have successively analyzed these bodies, and the result of their labours, as ably brought together in the work of the last mentioned author, is, that whilst they have a great general resemblance, and are distinguishable on the whole by their composition from any bodies found in the crust of the earth, each of their component substances is individually found in our planet. They are also peculiarly marked by the small number of minerals which have collectively been detected in any one of them—nickel and cobalt, in certain relations to iron, being the chief characteristics of the metallic meteorites.

Of the various theories propounded to account for the origin of these singular bodies, it would indeed ill become a geologist like myself to speak; and referring in the sequel to some of the various works in which the subject has been brought within formula, I will at once detail the facts connected with the discovery of this metalliferous body in the heart of a tree, as now placed before the Members of our Society, feeling assured that, whatever be their ultimate decision, my contemporaries will approve of the efforts that have been made to account for this singular and mysterious phenomenon.

On the 2nd of June, a timber merchant, residing at North Brixton, named Clement Poole, brought the specimen now exhibited to the Museum of Practical Geology, when it occurred to Mr. Trenham Reeks, our Curator, that it might be a meteorite, and on inspecting its position in the mass of wood, and having heard all the evidence connected with it, I was disposed to form the same conclusion. On submitting a small portion of the metallic part to a qualitative test in the metallurgical laboratory of our establishment, the presence of nickel, cobalt, and manganese was detected in the iron included in the mass, and as the surface was scorified, indented, uneven, and partially coated with a peculiar substance, the surmise as to the meteoric nature of the imbedded material seemed to be rendered much more probable. Again, in looking at the wood which immediately surrounded that portion of the mass which remained, as it is now, firmly inserted in the tree, a blackened substance was observed to be interpolated between the supposed meteorite and the surrounding sound wood. On the outside of this substance (which had somewhat a charred aspect) we observed a true bark, which follows the sinuosities of the wood wherever the latter appears to have been influenced by the intrusion of the foreign mineral matter. [The specimen is represented in the annexed wood-cut.]

Seeing thus enough to satisfy our conjecture, if sanctioned by other evidence, I

desired Mr. Poole to bring all the fragments of the wood he had not destroyed which surrounded this body. On placing the ends of some of these (also now exhibited) on the parts from which they had been sawed off, they indicated that the space between the mineral substance and the surrounding sound wood widened upwards ; the decayed wood passing into brown earthy matter with an opening or cavity into which rootlets extended. On interrogating Mr. Poole, who cut down the tree and superintended the breaking up of its timber, I learnt from him all requisite particulars respecting its dimensions, the position of the ferruginous mass, the quantity of wood above and below it, a description of the place where the stool of the tree was still to be seen, and of the parties who, living on the spot, were acquainted with every circumstance which could throw light on the case.

At this period of the inquiry, the Museum in Jermyn Street was visited by Dr. Shepard, Professor in the University College, Amherst, United States, whose researches on meteorites are widely known, and who has furnished an able classification of them by which they are divided into the two great classes of stony and metallic. Having carefully examined the specimen, Dr. Shepard expressed his decided belief that it was a true meteorite, and the next day wrote to me the following account of it ; at the same time referring me most obligingly to a series of interesting publications on the subject as printed in America and Europe :*—

" Concerning the highly interesting mineral mass, lately found enclosed in the trunk of a tree, and of which you have done me the honour to ask my opinion, I beg leave to observe, that I have no hesitation in pronouncing it to be a true meteoric stone.

" Aside from the difficulty of otherwise accounting for it, under the circumstances in which it is found, the mass presents those peculiar traits that are regarded as characteristic of meteorites. It has, for example, a fused, vitrified black coating, which is quite continuous over a considerable part of the mass, and contains several grains and imbedded nodular and vein-like portions of metallic iron, in which I understand nickel and cobalt have been detected.

" The general character of the body of the stone is indeed peculiar ; and as a whole, unlike any one I have yet seen ; it being principally made up of a dull greyish-yellow peridotic mineral, which I have nowhere met with among these productions, except in the Hommoney Creek meteoric iron mass, and which exists in it only in very limited quantity. It is singular to remark also, that the stone under notice strikingly resembles in size, shape and surface, the iron above alluded to.

" The absence of the black, slaggy coating on one of the broad surfaces of the stone, may arise from its having been broken away by the violence to which it must have been subjected in entering the tree ; for it appears to have buried itself completely at its contact, an operation which would probably have been impossible, in the case of a stone, but for its wedge-shaped configuration, and the coincidence of one of its edges with the vertical fibres of the wood."

In reply to a question I subsequently put to Dr. Shepard as to whether he knew of any examples of meteorites having struck trees in America, he replied as follows:

" I think you will find in the volume I left with Mr. Reeks at the Museum, an account of the fall of Little Piney, Missouri, February 13th, 1839, in which it is stated that the stone struck a tree and was shattered to fragments, it being one of a brittle character. In the interior of the Cabarras county, N. Carolina, a stone (October 31, 1849) I know struck a tree, and I found it was difficult, indeed impossible, to separate completely the adhering woody fibres from the rough hard crust of

---

* Dr. Shephard's numerous memoirs on meteorites are all to be found in the volumes of the *American Journal of Science and Art*, and in the same work the reader will find not only the general classification of these bodies by this author, who possesses a collection from 103 localities, but also essays on the same subject by his countrymen Dr. Troost, Professor Siliman, jun., and Dr. Clark.

In our own country, Dr. Brayley published some years ago a comprehensive view of this subject in the *Philosophical Magazine*, and recently Mr. Greg has in the same publication put together all the previous and additional materials, with tables showing the geographical distribution of meteorites. Among the well-recorded examples of the fall of metalliferous meteorites, no one is more remarkable than that which happened in the year 1851, about sixteen leagues S.E. of Barcelona in Spain. In describing that phenomenon, Dr. Joaquim Balcells, Professor of Natural Sciences at Barcelona, has illustrated the subject with much erudition, whilst his theoretical views are ingenious in his endeavour to explain how meteorites are derived from the moon.

the meteorite. The stone in this case is a peculiarly tough one, having a decidedly trappean character, rendering it as nearly infragile as cast iron."

Aware that some time must elapse before the precise analysis which I wished to be made in the laboratory of Dr. Percy could be completed, and that the last meeting of the Royal Society was to be held this evening, I announced the notice I am now communicating. At the same time I resolved to visit the locality where the tree stood, and to obtain on the spot all the details required. Having done so, accompanied by Mr. Robert Brown, Sir Philip Grey Egerton, Professor J. Nicol, and Mr. Trenham Reeks, the information ultimately obtained was as follows :—

The man who helped to cut down the tree confirmed in every respect the evidence of Mr. Poole as to its position, height, and dimensions, and pointed out to us the stump or stool we were in search of, which is to be seen at nearly 200 yards to the east of the St. George's Chapel, Lower Road, Battersea Fields, and at the eastern end of a nursery garden, between the railway and the road, occupied by Mr. Henry Shailer.

The tree was a large willow, probably about sixty years of age, which stood immediately to the east of the old parsonage-house recently pulled down. Its stem measured about ten feet in circumference at three feet above the ground, and had a length of between nine and ten feet ; from its summit three main branches extended, one of which, pointing to the S.W. or W.S.W., had been for many years blighted, and was rotten to near its junction with the top of the main trunk; a portion of this blighted main branch is exhibited. The other two main branches, which rose to a height of fifty or sixty feet, were quite sound ; a part of one of these offsets is also exhibited.

The stool of the tree was visibly perfect and without a flaw, and at the wish of Mr. R. Brown, a section of it has been obtained since our visit, which is also here, and the rings of which seem to confirm the supposition as to the age of the tree.

Mr. Poole having conveyed the tree to Brixton, cut the trunk into two nearly equal parts, intending to make cricket-bats out of each. In doing so, he perceived that the upper portion of the lower of the two segments was in a shaky or imperfect condition, and hence he resolved to saw off the upper part of it, intending thereby to obtain wood large enough for the " pods " of his cricket-bats, but not such entire bats as he was making out of the upper segment.

In dividing the tree, the saw was stopped at about eight inches from the surface on one side (or the breadth of a large saw) by a very hard, impenetrable substance, which was supposed to be a nail, and hence Mr. Poole resolved to break up the portion of the wood he had previously condemned as of inferior quality, and hewing it down from the sides, he uncovered, to his astonishment, the great lump of metalliferous matter, as now seen. Attaching little value to it, much of the surrounding wood was thrown away or used up before the specimen was brought to Jermyn Street, but enough has been obtained to throw light on the probable or possible origin of the included mass.

On interrogating Henry Shailer, a market gardener, who has long lived on the spot and managed the ground where the tree grew when it was part of the garden of the former clergyman (Mr. Weddell), I learnt from him that he had known the spot for sixty years, that in his days of boyhood it was a fellmonger's yard, before it was attached to the garden. He had observed that the tree was blighted in one of its main branches for many years, and had always supposed that it was struck by lightning in one of two storms, the first of which happened about 1838 or 1839, the other about nine years ago.

So far the evidence obtained might be supposed to favour the theory that this ferruginous mass* had been discharged near to the blighted branch, and had penetrated downwards into the tree, to the position in which we now see it, charring and warping the wood immediately around it in its downward progress; whilst in the sixteen years which have elapsed, the wood renovating itself, produced the appearance which has so much interested the eminent botanists who have examined it, viz., Mr. R. Brown, Dr. Lindley, Professor Henfrey, Dr. J. Hooker, and Mr. Bennett.

On the other hand, I must now point out some features of this extraordinary case, which check the belief in the included mass being a meteorite.

---

* The ferruginous mass is, it is supposed, about thirty pounds in weight ; but as one of its extremities is still imbedded in the wood, the precise weight cannot be stated.

We found lying near the root of the tree two fragments, one of which is similar to the substance included in the tree, while the other is decidedly an iron slag. On bringing these fragments, weighing several pounds, to Jermyn Street, and on breaking one of them, it was found, like the supposed meteorite, to contain certain small portions of metallic iron, in which both nickel and cobalt were also present ; and hence the scepticism which had prevailed from the beginning of the inquiry in the minds of some of my friends, was worked up into a definite shape.

The occurrence of stones enclosed in wood is not a novel phenomenon. Mr. Robert Brown has called my attention to two cases as recorded in the following works :—

"De Lapide in Trunco Betulæ reperto." G. F. Richter in *Acta Phys. Med. Acad. Nat. Curios.*, vol. iii., page 66.*

"Descriptio Saxi in Quercu inventi." Kellander, *Acta Literaria et Scientiæ Sueciæ*, 1739, pp. 502, 503.

Since the Battersea phenomenon was announced, Professor Henslow, to whom I had applied, wrote to me, saying that he possessed a remarkable example of a stone which was found imbedded in the heart of a tree, in sawing it up in Plymouth Dockyard ; and he has obligingly sent up the specimen, which is now also exhibited. In this case, judging from the mineral character of the rock, and its being slightly magnetic, Professor Henslow supposed that it was perhaps a volcanic bomb. On referring it to Dr. Shepard, that gentleman entertains the opinion that it is also a meteorite, and states that it resembles certain meteoric stones with which he is acquainted ; suspicions of which had also been entertained by Professor Henslow. From the examination of a minute fragment which I detached from this stone, it appears to be composed of a base of felspathic matter, with minute crystals of felspar and of magnetic iron pyrites. Externally it has a trachytic aspect, though, when fractured, it more resembles, in the opinion of Mr. Warington Smyth, a pale Cornish elvan or porphyry than any other British rock with which it can be compared. Whatever may have been the origin of this stone, which is of the size of a child's head, it is essentially different from the metalliferous mass from Battersea, to which attention has been specially invited, and its position in the heart of an oak is equally remarkable. Like the Battersea specimen, the segment of wood from Plymouth Dockyard is characterized by an interior bark which folds round the sinuosities of the included stone.

In respect to the envelopment of manufactured materials in trees, my friend Mr. H. Brooke, the distinguished mineralogist, tells me that he perfectly remembers the case of an iron chain which had been enclosed in the heart of a tree, the wood of which was sound around the whole of the included metallic body. This specimen was to be seen some years ago in the British Museum. Again, he informs me that at Stoke Newington he recollects to have seen a tree, the trunk of which had grown over and completely enclosed a scythe, except on the sides where its ends protruded.†

Whatever may have been the origin of the metalliferous mass from Battersea, its discovery has at all events served to develop certain peculiarities in the growth of plants which appear to be of high interest to the eminent botanists who have examined the parts of this tree which surrounded the supposed meteorite. Unwilling to endeavour to anticipate the final decision as to the origin of the body in question, I may be permitted to feel a satisfaction that its discoverer brought it to the establishment of which I am the Director, and which numbers among its officers a Fellow of this Society, who is so well calculated, by his analytical researches, to settle the question on a permanent basis. Should the metallurgical analyses now under the conduct of Dr. Percy lead to the inevitable conclusion that the composition of this body is different from that of well-authenticated meteorites, and is similar to that of undoubted iron slags, we shall then have obtained proofs of the great circumspection required before we assign a meteoric origin to some of these crystalline iron masses,

---

* "Lapis prædurus subalbicans et manifeste siliceus pruni ferme aut juglandis minoris magnitudine.* * * * Nidus ad figuram lapidis non plane accommodatus, sed quadrangulus, et hinc illinc in mediocres rimas desinens, corticeque imprimis notabili, non multum ab exteriori cute diverso, maximam partem vestitus."

† Many other examples of extraneous bodies found enclosed in the heart of trees have been brought to my notice since this account was written. The most curious of these is perhaps that of an image of the Virgin, which having been placed in a niche had become imbedded by the growth of the tree around it.

which though not seen to fall, have, from their containing nickel, cobalt, and other elements, been supposed to be formed by causes extraneous to our planet.

Postscript, 30th June, 1855.—The following are the analyses above referred to, which have been given to me by Dr. Percy since the preceding notice was read :—

" *The slag-like matter* (1) attached to the metal in the tree, as well as the similar matter (2) with adherent metal which was found by Mr. Reeks in the vicinity of the tree, has been analysed. The results are as follow :—

	No. 1.	No. 2.
Silica	58.70	63.52
Protoxide of iron	35.46	32.30
Lime	0.30	0.59
Magnesia	0.74	0.21
Protoxide of manganese	trace	trace
Alumina	3.40	2.85
Phosphoric acid	0.43	0.57
Sulphur as sulphide	trace	trace
	99.03	100.04

" No. 1 was analysed by Mr. Spiller, and No. 2 by Mr. A. Dick, Chemists, who have been incessantly engaged at the Museum during the last two years and a half in the analyses of the iron ores of this country, and whose great experience renders their results worthy of entire confidence. Cobalt and nickel were not sought for in either case, but the metallic iron enveloped in both specimens contained a minute quantity of cobalt and nickel. Another piece of slag-like matter, which was found on the ground near the tree, and which from its external characters I have no hesitation in pronouncing to be a slag, was examined for cobalt and nickel, and gave unequivocal evidence of the former in minute quantity, though not satisfactorily of the latter.

" The metal previously mentioned is malleable iron. That which was detached from the slag-like matter, found outside the tree, was filed and polished, and then treated with dilute sulphuric acid. After this treatment, the surface presented small, confused, irregularly-defined crystalline plates, and was identical in appearance with the surface of a piece of malleable iron similarly treated after fusion in a crucible."—*Proceedings of the Royal Society*, vol. vii., No. 14.

ON THE FORMATION OF INDIGO-BLUE.

BY EDWARD SCHUNCK, PH.D., F.R.S.

[The following contains the introductory and an abstract of the subsequent part of an interesting and important paper on the above subject, which was read before the Literary and Philosophical Society of Manchester on April 3, 1855, and published in the Memoirs of the Society, vol. xii.]

"Indigo, one of the most important and extensively used dyes, owes its value entirely to a peculiar colouring matter contained in it, to which the name of *indigo-blue* or *indigotine* is applied by chemists. This substance has been repeatedly subjected to investigation, and several distinguished chemists have bestowed their attention and labour upon it. Its properties, composition, and products of decomposition, have been so carefully examined, that it may safely be asserted that there are few organic substances whose nature is more accurately known than that of indigo-blue. If, however, we inquire into the state of our knowledge regarding the origin and mode of formation of this body, it will be found that our information on this part of the subject is extremely defective. Indigo-blue may be obtained from a variety of plants, which, though belonging to the most different genera and orders are rather limited in number. It has sometimes been observed to form in the milk of cows, especially such as have been fed exclusively on saintfoin.* Latterly it has been discovered by Hassall† and others‡ in human urine, where its occurrence is

* *Annales de Chimie et de Physique*, vol. iii., p. 269.
† *Philosophical Transactions* for 1854.
‡ *Ann. der Chem. und Pharm.*, vol. xc., p. 120.

attributed to a morbid state of the system. It is therefore a substance which is formed sparingly indeed, but in widely distant parts of the organic world. The properties of indigo-blue, which are so peculiar as almost to separate it from all other organic bodies, and to constitute it one *sui generis*, naturally suggest the inquiry, in what form it is contained in the plants and animals from which it is derived. If it exists ready formed in the indigo-bearing plants, how is it that though, when in a free state, insoluble in water, acids, alkalies, alcohol, and most simple menstrua, it should so easily be extracted from those plants by a mere infusion with cold water? If it does not pre-exist in the plant, in what state of combination is it contained therein, and what is the nature of the process by which it is eliminated? The usual method of preparing indigo from the *Indigoferæ* consists in steeping the plant, especially the leaves, in water, drawing off the infusion, allowing it to undergo fermentation, and then precipitating by means of agitation with air and the addition of lime-water. Now it may be asked, is this process of fermentation, which is often very tedious and difficult to manage, essential to the formation of indigo-blue, or is it merely an accidental phenomenon attending its preparation? If it is essential, at what stage of the process is the formation of the colouring matter to be considered as completed? and is it necessary, as some persons assert, to continue it until actual putrefaction has commenced or not? These are points which, though perhaps of little consequence to the dyer and consumer of indigo, are of great interest in a chemical point of view, and are of the greatest importance to the manufacturer of indigo. To the latter it must surely be extremely desirable to know the exact nature of the process on which his manufacture depends, and to ascertain whether this process yields into his hands the whole quantity of the product which the material employed is capable of yielding, and also whether the manner of conducting it is in perfect accordance with theoretical requirements. If, however, we consult the authors who have written on this subject, and the chemists who have endeavoured to elucidate it, we shall obtain very unsatisfactory replies to our inquiries. The views entertained on these different points are either mere surmises, or they are conclusions founded on a limited number of frequently imperfect experiments. The chief cause of our ignorance on these questions is, probably, that the process of manufacturing indigo is one carried on, not in the more highly civilized regions, but in remote parts of the world; and we are consequently obliged to rely for our knowledge concerning it chiefly on the accounts of travellers, who are usually possessed of merely general information, or of the manufacturers themselves, who are far from competent to give an opinion on a complex organo-chemical process.

"Fourcroy, according to Robiquet, considered the formation of indigo-blue to be a result of the process of fermentation employed in its preparation.

"Roxburgh, who is the earliest authority I have had an opportunity of consulting on this subject, states that his predecessor, De Cossigny, whose work on the manufacture of indigo, published in the Mauritius, is very rare, was of opinion that volatile alkali was the agent by which the colouring matter was extracted from the plant and held in solution until volatilized by the agitation process. Roxburgh, who, like De Cossigny, was one of the few possessing special chemical information who have examined the process of manufacturing indigo from the *Indigoferæ* on the spot, concluded, from his experiments, 'that the indigo plants contain only the base of the colour, which is naturally green; that much carbonic acid is disengaged during its extrication from the leaves; that the carbonic acid is the agent whereby it is probably extracted and kept dissolved; that ammonia is not formed during the process; that the use of alkalies is to destroy the attraction between the base and the carbonic acid; and that the vegetable base being thereby set at liberty, combines with some colouring principle from the atmosphere, forming therewith a coloured insoluble fecula, which falls to the bottom and constitutes indigo.'* Roxburgh first directed attention to the fact, that it is possible to obtain indigo by merely treating the plant with hot water, and then agitating the infusion with air, from which it follows that fermentation is not an absolutely essential condition of the formation of indigo-blue.

"Chevreul,† who was the first chemist of any eminence who examined the indigo-bearing plants and their constituents, inferred from his analyses of the *Isatis*

---

* *Transactions of the Society of Arts*, vol. xxviii.

† *Ann. de Chim.*, sér. 1., vol. lxvi., p. 5; vol. lxviii., 2 84.

tinctoria and *Indigofera anil*, that these plants contain indigo in the white or reduced state, in the same state in which it exists in the indigo vat ; that in this state it is held in solution by the vegetable juices ; and that when this solution is removed from the plant, it is converted by the action of the atmospheric oxygen into indigo-blue. The authority of so distinguished an investigator as Chevreul has had great weight with chemists, and most persons have adopted his view without question, though it is founded chiefly on the fact of the colouring matter being deposited from a watery extract of the plant, and of the only form in which it is known to be soluble in water being that of reduced indigo.

"According to Michelotti,* the extraction of indigo consists simply in dissolving a compound made of malic acid and indigo, which is afterwards decomposed by the precipitants employed.

"A few years after the appearance of Chevreul's memoirs, Giobert, Professor of Chemistry at Turin, published a work on Woad,† which enunciates ideas on this subject far more nearly approaching the truth than those either of his predecessors or successors on the same field of investigation. The chief conclusions at which he arrived, partly by experiment and partly by reasoning, are contained in the following propositions :—1. Indigo-blue does not pre-exist in the plant, but is formed by the operations by means of which we believe it to be extracted. 2. There exists in a small number of plants a peculiar principle, different from all the known proximate constituents of plants, and which has a tendency to be converted into indigo ; this principle may be called *Indigogene*. 3. This principle differs from indigo in containing an excess of carbon, of which it loses a portion in passing into the state of indigo-blue, by means of a small quantity of oxygen which it takes up. 4. The loss of this portion of carbon is caused by the latter undergoing combustion, and being converted into carbonic acid. 5. It differs in its properties from common indigo in being colourless, in being soluble in water, and by its greater combustibility, which causes it to undergo spontaneous combustion at the ordinary temperature of the atmosphere. 6. Its combustibility is enhanced by heat and by combination with alkalies, especially lime ; it is diminished by the action of all acids, even carbonic acid.

"About the year 1839, the *Polygonum tinctorium*, an indigo-bearing plant indigenous to China, became the subject of a series of investigations by several French chemists, chiefly in order to ascertain whether this plant, if grown in France, could be advantageously employed for the preparation of a dye to substitute foreign indigo, so as to obviate the necessity of paying such large sums to foreign nations for this article, a necessity which seems at all times to have been a subject for extreme regret in France. Baudrimont and Pelletier, after an examination of this plant, concurred in the opinion of Chevreul, that the indigo is contained in it as reduced indigo ; and the latter adduced in support of this view an experiment, which consisted in treating fresh leaves of the *Polygonum* with ether, taking care to exclude the air, until the green colour had changed to white, when, on exposure to the atmosphere, they speedily became blue. Robiquet,‡ Colin,§ Turpin,‖ and Joly,¶ on the other hand, expressed a very decided conviction that indigo-blue pre-exists in the *Polygonum tinctorium*, but not in a free state ; that it is combined with some organic substance or substances, which render it soluble in water, ether, and alcohol ; and that it requires the operation of potent agencies in order to destroy this combination and set the indigo at liberty. Osmin Hervey,** in a memoir on the *Polygonum tinctorium*, which in some parts is rather obscure, inferred from his experiments: —1. That indigotine exists in the leaves of this plant in a state of combination with a resin. 2. That this natural compound of indigo and resin contains both white indigo and blue indigo, and of the latter a larger proportion the older the leaves are. 3. That by the influence of certain organic

* *Journal de Physique*, Avril 1812.

† *Traité sur le Pastel et l'Extraction de son Indigo.* Paris, 1813.

‡ *Journal de Pharmacie*, vol. xxv., p. 62.

§ *Mémoire sur la Renouée des Teinturiers.* Paris, 1839.

‖ *Etudes microscopiques sur le gisement de la matière bleue dans les feuilles du* Polygonum tinctorium. *Mémoire lu à l'Académie des Sciences le* 12 *Novembre* 1838.

¶ *Observations générales sur les plantes qui peuvent fournir des couleurs bleues à la teinture.* Montpellier, 1839.

** *Journal de Pharmacie*, vol. xxvi., p. 290.

substances, the indigo-blue is again reduced to the colourless state, if the solution be effected by means of water, without any destruction of the natural compound taking place. Girardin and Preisser* again returned to Chevreul's view, that the colouring matter is contained in the leaves of this plant in the form of reduced indigo. Since the publication of these treatises, no new ideas have, as far as I know, been promulgated by chemists in reference to this subject.†

"It will be seen that the opinions of the chemists which I have just shortly reviewed are of three kinds, and may be stated as follows:—1. Indigo-blue exists ready formed in the plants from which it is derived. 2. It is contained in these plants in the form of reduced indigo. 3. It does pre-exist in the vegetable, but is formed subsequently to the extraction of the latter by means of a process of fermentation, a process which manifests itself by the evolution of gases of various kinds. To each of these views very strong objections may be raised. If the colouring matter is formed at once in the plant, it is difficult to conceive by what means it comes to be dissolved by water, for no combination of indigo-blue with any organic substance can be produced which is soluble in water. If to this it be objected that a compound of this nature is produced by the plant, and cannot after decomposition be reproduced, then it is at once admitted that indigo-blue is not contained as such within the vegetable : that it cannot exist as reduced indigo is evident, since the latter requires the presence of some alkali for its solution in water, and the juice of most, if not all, indigo-bearing plants is acid. It is difficult, moreover, to conceive how deoxidized indigo, a body having so great an affinity for oxygen, can exist in the interior of plants which we know are constantly evolving that element. That the colouring matter is formed by the process of fermentation to which the extract of the plant is subjected, as it is the oldest so it is the most probable view. Nevertheless, the fact that indigo may be procured from plants by mere infusion with hot water, and precipitation with lime-water, without any of the usual signs of fermentation being manifested, appears to militate against this view. On one point all authorities seem to agree, viz., that the contact with oxygen is a necessary condition of the formation, or at least precipitation of the indigo from the watery extract.‡

"Such being the state of our knowledge on this rather obscure department of chemical science, I resolved, though without anticipating any very decided success, to endeavour to throw a little more light on it. I was induced to do so chiefly by the following consideration. The principal vegetable colouring matters have now been discovered to be not direct products of the vital energy of plants, but products of decomposition of substances contained in the vegetable, which are themselves mostly colourless. The formation of these colouring matters takes place equally well out of the plant as within it. Indeed, it is probable that it never happens within the plant until decay has commenced, or at least until the vital energy has begun to decline. The processes of decomposition by which colouring matters are formed from other substances are of two kinds. The first consists in the absorption of oxygen and the elimination of hydrogen in the form of water ; it is a process of decay (*Verwesung*, Liebig), and requires the presence not only of oxygen, but of some alkali or other base. The second process is one which consists in the splitting up of the original compound into two or more simpler bodies, of which one or more are colouring matters ; it is a process of fermentation, and may in general be effected as well by the action of strong acids as by that of ferments. The first process gives rise to colouring matters of a very fugitive nature, such as the colouring matters of logwood and archil. Indeed, in this case the colouring matter, if this name be applied merely to substances endowed with a striking and positive

---

* *Journal de Pharmacie*, vol. xxvi., p. 344.

† I cannot refrain from expressing on the present occasion my regret, which is probably shared by many others, at the want of a general chemical bibliography, comprising references to all the known works, treatises, papers, &c., on chemical subjects, written since the commencement of the modern era in Chemistry. In searching for the authorities referred to in this paper, I have felt this want very sensibly. It is with some difficulty that the mere names of all the works and memoirs relating to any special branch of the science, particularly such as have fallen into oblivion, are discovered. The only attempt to supply this deficiency, and that only in regard to one department of chemistry, is Wolff's *Quellenliteratur der Organischen Chemie.* Halle, 1845.

‡ Gehlen is the only chemist who, as far as I am aware, has asserted that the agitation with air in the manufacture of indigo may have for its object, not so much the oxidation as the aggregation or separation of the particles of indigo from the solution. *Vide* Schweigger's Journal, vol. vi., 1812.

colour, is only one of a long chain of bodies succeeding one another, and is generally not the last product of decomposition. The other process, of which the formation of alizarine is an example, yields colouring matters of a fixed and stable character, which are not further changed by a continuance of the process to which they owe their formation. Now if indigo-blue be a body which is formed from some colourless substance existing in the plant, we should infer, *à priori*, that the process by which it is formed is one of fermentation or putrefaction, not requiring the intervention of oxygen or of alkalies; a conclusion, however, so much at variance with the generally received ideas on the subject of the formation of indigo-blue, as to require the aid of very decisive experiments for its establishment."

The author proceeds to give an account of the experiments he undertook for the elucidation of the subject. The plant used for these experiments was woad, *Isatis tinctoria*, this being the only plant cultivated in this country which is known to yield indigo in any quantity. Half an acre of land was cultivated with woad. During the growth of the plants there were not at any time any visible indications of the presence of blue colouring matter on the leaves or stems; but some of the ripe seeds had a dark purple tinge on their surfaces.

Some preliminary experiments showed that the *Isatis tinctoria* contains a substance easily soluble in hot and cold water, alcohol, and ether, which, by the action of strong mineral acids, yields indigo-blue; that the formation of the colouring matter from it can be effected without the intervention of oxygen or of alkalies; and that the latter, indeed, if allowed to act on it before the application of acid, entirely prevent the formation of the colouring matter. The isolation of the substance producing the colouring matter was found to be attended with some difficulty, the substance being extremely liable to decomposition. The continued action of water, even at a moderate, but especially at a high temperature, as well as that of alkalies, was found completely to change the body. When extracted from the plant with alcohol or ether this body is less liable to change, hence one or other of these latter menstrua were employed in preference to water for exhausting the plant of the substance yielding the colouring matter.

The leaves of the mature plant having been carefully selected, dried, and powdered, the powder was treated in the following manner, this being the process which, of three that were tried, gave the best results:—

The powdered woad leaves are exhausted, in a displacement apparatus, with cold alcohol. To the green tincture thus obtained an alcoholic solution of acetate of lead is added, which throws down a pale green precipitate, and the precipitation is completed by the addition of a little ammonia. The precipitate, which is bulky, is placed on a filter and washed with cold alcohol; it is then suspended in water, and a current of carbonic acid gas is passed through the liquid. The precipitate gradually becomes paler in colour, and at last almost white, and loses considerably in bulk, while the liquid acquires a yellow colour. The latter being filtered, sulphuretted hydrogen is passed through it to precipitate a little oxide of lead contained in it, and being again filtered to remove the sulphuret of lead, the clear liquor is submitted to spontaneous evaporation, either *in vacuo* or otherwise, over sulphuric acid. A yellow, transparent, glutinous substance is thus obtained, which may be dried by spreading it out in thin layers and leaving it for some time *in vacuo* over sulphuric acid. The author proposes to call the substance *Indican*.

It is necessary to avoid the application of heat in the evaporation of aqueous solutions of indican, as it causes an entire change, in which the indican takes up the elements of water.

The taste of indican, as obtained by the above process, is slightly bitter and nauseous. Its solutions have an acid reaction, but the author has not determined whether this belongs to the substance in a perfectly pure state, or whether it is due to the presence of some impurity. When heated in a tube it swells up, and gives fumes which condense into an oily sublimate, in which, after some time, a white crystalline substance is formed. When boiled with caustic alkali it evolves ammonia. Its compounds have a yellow colour. An alcoholic solution of indican gives with sugar of lead a bright sulphur-yellow precipitate, which is increased by the addition of ammonia. The watery solution gives no precipitate until ammonia is added.

The most remarkable and interesting property of indican is that of yielding indigo-blue when treated with strong acids. If sulphuric or muriatic acid be added to its watery solution, no change whatever is perceptible for some time; but on heating it

to near its boiling point, the solution becomes sky-blue. On boiling for a short time the solution becomes opalescent. On continuing to boil it acquires a purple colour, and then, provided the solution is tolerably concentrated, a copious deposit consisting of dark purplish-blue flocks is formed. The liquid filtered from these flocks retains a yellow colour, and contains a peculiar species of sugar, which will be further referred to presently.

The flocks which had separated after the boiling do not consist merely of indigo blue. After being collected on a filter and washed with water, they appear of a dark purple colour. If they be now treated with alcohol, a part dissolves even in the cold, but to a greater extent on heating, the alcohol acquiring a beautiful purple colour. If boiling alcohol be then added it acquires a more bluish tinge, and each succeeding addition of boiling alcohol acquires more and more of a blue colour. There remains in general a large quantity of indigo-blue undissolved, and the alcoholic liquids, on standing, deposit bright blue flocks.

The purple alcoholic solution leaves, on evaporation, a reddish-brown residue, which bears the greatest resemblance to, if it be not identical with, the indigo-red of Berzelius. Like the latter substance, it is quite insoluble in caustic alkalies, and gives, when heated in a tube, purple fumes and a small quantity of a white crystalline substance. The author proposes to call this substance *Indirubine*. This and indigo-blue appear to be produced from the same substance, namely *indican*.

Another remarkable property of indican was observed. If an aqueous solution of it in a syrupy state be heated for some time in the water-bath, or if its aqueous solution be boiled or even moderately heated, it undergoes a complete metamorphosis. If the solution be now evaporated, it leaves a yellow syrupy residue, not to be distinguished in appearance from indican itself. It will be found, however, to have become insoluble in ether, and not easily soluble in alcohol. If ether be added to its solution in alcohol, the solution becomes milky, and deposits oily drops, which collect at the bottom of the vessel as a yellow or brown syrup, while the indican itself, if there be any present, remains dissolved in the ether. By continuing the process, other changes are produced. If the watery solution of these products be boiled with the addition of sulphuric or muriatic acid, after a time it slowly deposits a quantity of dark brown, almost black flocks. The liquid filtered from these flocks contains sugar, just as in the case of indican itself. The flocks generally consist of two bodies. On treating them with boiling alcohol, part dissolves, and on evaporation is left as a dark brown, shining, resinous substance. The author proposes to call this body *Indiretine*. The part of the dark brown flocks which is insoluble in boiling alcohol dissolves in caustic alkalies, and is precipitated by acids in black flocks. The author calls this *Indihumine*.

The sugar which is formed when acids act either on indican or on the products obtained by boiling indican with water, is got in a state of purity in the following way :—If sulphuric acid has been employed, which is preferable to muriatic acid, the acid liquid from which the flocks have been separated is deprived of the sulphuric acid by the addition of acetate of lead, which is used in excess. Ammonia is now added to the clear liquor after the separation of the sulphate of lead, when the sugar is precipitated in combination with oxide of lead. The precipitate, which is usually yellow and bulky, is, after washing, decomposed with sulphuretted hydrogen, and the syrup treated again in the same way, if necessary, to render it colourless or nearly so. This syrup has the following properties. It has a faintly sweet taste. When heated, it swells up, emitting the usual smell of burning sugar. Concentrated sulphuric acid gives it a dark red colour, which becomes black on being heated. With sulphate of copper and caustic soda it forms a blue solution, which on boiling becomes yellow, and then deposits suboxide of copper. If nitrate of silver be added to its watery solution while boiling, a little metallic silver is precipitated, and a further reduction takes place, accompanied by the formation of a metallic mirror if ammonia be added. In its outward properties, therefore, this sugar does not differ in any marked degree from other kinds of sugar obtained by the decomposition of complex organic bodies, such as that derived from rubian. In its composition, however, it differs essentially from other species of sugar. The author ascribes the formula $C_{12}\ H_{10}\ O_{12}$ to this sugar. The indican could not be got in a perfectly pure state, and therefore the result of its analysis was not quite satisfactory, but the author is disposed to ascribe to it the formula $C_{52}\ H_{33}\ NO_{36}$, and the production of indigo-blue from indican is explained by assuming that an

atom of indican takes up two atoms of water, and then splits up into one atom of indigo-blue and three atoms of sugar, as represented by the following equation :—

$$\left.\begin{array}{l}\text{1 at. indican} \ldots\ C_{52}H_{33}NO_{36}\\ \text{2 at. water}\ldots\ldots\ H_2\quad O_2\end{array}\right\} = \left\{\begin{array}{l}C_{16}H_5NO_2 \text{ 1 at. indigo-blue}\\ C_{36}H_{30}\quad O_{36} \text{ 3 at. sugar}\end{array}\right.$$

$$C_{52}H_{35}NO_{38} \qquad C_{52}H_{35}NO_{38}$$

The results of this investigation may be summed up in the following propositions:—

1. The *Isatis tinctoria* does not contain indigo-blue ready formed, either in the blue or colourless state.
2. The formation of the blue colouring matter in watery extracts of the plant is neither caused nor promoted by the action of oxygen or of alkalies.
3. Indigo-blue cannot be said to exist in any state of combination in the juices of the plant, it is merely contained in them potentially.

ON THE FUNCTION OF SALT IN AGRICULTURE.

BY A. BEAUCHAMP NORTHCOTE, ESQ.,
Senior Assistant in the Royal College of Chemistry.

The employment of salt in agriculture has been of late years so much extended, that the question of the advantages derived from its use, which formerly gave rise to so many discussions, can no longer be raised. Such an accumulation of facts with regard to its action has now taken place, that it is only necessary to pass judgment upon the evidence recorded ; and as the practical results which have been obtained by its judicious application have been all more or less of a beneficial tendency, the verdict given cannot fail of being in its favour. It seems to be an incontrovertible fact, that the application of salt to certain lands does increase their fertility, and improve the character of the crops grown upon them ; and if this is the case, it is most desirable that we should have as clear an idea as possible of the *rationale* of its action. I do not in the present paper profess to supply this explanation, although I hope that the experiments which I am about to detail may serve to throw some light upon a somewhat obscure subject.

It has long been held that the beneficial action which salt exerts upon soils is due to a power which it possesses of fixing ammonia, and with this view it has frequently been spread over the surface of dung-heaps, or other organic matters decomposing into manures (sometimes also being mixed up with them), with the view of preventing the escape of the ammonia produced in the course of eremacausis : in some cases success has attended these trials, and in some failure. The question of its absorption of the ammonia eliminated during these changes, is a matter the investigation of which must necessarily be attended with great difficulty ; but with respect to its capability of such absorption, I am informed by my friend Mr. Prideaux that he has habitually observed that salt mixed with guano retards the exhalation of ammonia from the latter ; and he has directed my attention also to some experiments * conducted by M. Barral, one of which proves this point in a remarkable degree. M. Barral exposed to the air for fifteen days equal weights of guano, and of guano previously mixed with half its weight of salt : the amount of nitrogen in each being determined at the end of that time, he found that the pure guano had lost 11.6 per cent. of its nitrogen, whilst that mixed with salt had lost only 5 per cent.

Before entering, however, upon the experiments which I have made upon this subject, and which I may here state have exclusive reference to the absorption of ammonia, I will give the analyses and table of constituents calculated from them, of three specimens of agricultural salt which I have examined.†

---

* *Edinburgh Quarterly Journal of Agriculture*, April, 1855.

† The three specimens of which analyses are given were all produced from the Worcestershire brine-springs ; No. I. being from Mr. Corbett's works at Stoke Prior ; Nos. II. and III. from Messrs. Clay and Newman's and Mr. Noak's works at Droitwich, respectively.

Table of direct results of Analysis calculated to 100 *parts of the Dry Salt.*

	No. I.	No. II.	No. III.
Portion soluble in water...	98.174	99.520	97.803
contains—			
Soda	49.351	51.841	50.720
Lime	1.711	.493	.593
Magnesia	.084	.112	.111
Chlorine	54.824	58.928	57.217
Sulphuric acid	4.521	1.424	2.046
Silica	trace	trace	trace
Portion insoluble in water	1.826	.480	2.197
contains—			
Lime	.064	trace	.076
Magnesia	.038	.013	.037
Alumina	.026	.017	.472
Sesquioxide of iron	.161	.116	.319
Phosphoric acid	trace	trace	trace
Silica	.792	.190	1.044
Carbonic acid	.091	.014	.099
Organic matter	.654	.130	.150
	100.000	100.000	100.000

Table of Constituents calculated to 100 *parts of the Dry Salt.*

	No. I.	No. II.	No. III.
Sulphate of lime	4.155	1.197	1.440
Sulphate of magnesia...	.252	.336	.330
Sulphate of soda	3.388	.880	1.734
Chloride of sodium	90.342	97.106	94.287
Soluble in water	98.137	99.519	97.791
By experiment	98.174	99.520	97.803
Carbonate of lime	.114	trace	.135
Carbonate of magnesia	.079	.027	.077
Phosphate of alumina	trace	trace	trace
Alumina	.026	.017	.472
Sesquioxide of iron	.161	.116	.319
Silica	.792	.190	1.044
Organic matter	.654	.130	.150
Insoluble in water ...	1.826	.480	2.197
Total	99.963	99.999	99.988

Since the ammonia which occurs in nature, whether eliminated directly from decaying organic matters, or existing as atmospheric ammonia, is invariably in the immediate presence of an enormous excess of carbonic acid, we may safely conclude that it is always in the state of carbonate ; and as, on the one hand, it is brought down to the earth from the atmospheric regions dissolved in rain or dew, and, on the other, when met with in the soil itself, is usually in the presence of abundance of moisture, we may infer that the carbonate of ammonia is presented to absorbent agents in the soil for the most part in a state of solution. I do not think, therefore, that any great departure from the natural course of things can be alleged against the following experiments, which have been made with a solution of the commercial so-called sesquicarbonate of ammonia, containing 4.3 per cent. of ammonia (NH_4O).

Taking, then, these specimens of agricultural salt in the state in which they are supplied at the salt-works, the first thing was to ascertain whether any absorption occurred upon mixing them in that condition with this solution of carbonate of ammonia. Quantities of from two to three ounces of the salts were placed in wide-mouthed bottles, and small quantities of the standard ammonia solution added,

containing an absolute amount of ammonia (NH_4O) varying from .15 to .04 of a grain. The contents of the bottle were shaken together, and an extremely delicate red litmus-paper inserted ; it was completely blued in a minute or two ; and as the same action took place after allowing the salt and ammonia solution to remain all night in contact, the fact that no absorption had occurred was considered to be clearly proved. Water was then added in quantity just sufficient to moisten the salt, and upon the re-insertion of the test-paper, a diminished blueing showed that the ammonia was being absorbed ;* water was again added, yet in insufficient quantity to dissolve the whole of the salt, and the action upon the litmus was gone. In this way, by alternating the addition of the ammonia and the solution of the salt, the presence of the ammonia might be rendered more or less distinct, or unrecognizable. The reality of the absorption was thus rendered undeniable ; and it was equally evident that the soluble portion of the salt contained the absorbing agents, since the disappearance of the ammonia bore a direct proportion to the completeness of their solution. It then became a question as to which of the constituents of the soluble portion this agency was due.

Now the chloride of sodium being the largest ingredient, it was desirable at once to ascertain the part which it played in the matter : a saturated solution of the pure substance was therefore prepared, measured quantities of it taken, placed in bottles, and shaken with successive portions of carbonate of ammonia solution until a decidedly blue tinge was produced in the litmus-paper, which, for the purpose of having a standard test, was left enclosed in the atmosphere within the bottles for the space of five minutes. As the amount of ammonia added approached the maximum, its absorption became correspondingly slower, and it was necessary to leave it in contact with the salt solution for periods of from one to twelve hours ; a point was, however, always reached at which a certain tinge of colour was communicated to the paper, the intensity of which was not lessened if the test was applied again after a lapse of several days.

The following are the results which I have obtained in experimenting with a saturated solution of pure chloride of sodium in the above manner :—

Experiment.	100 grains of saturated solution of pure chloride of sodium will absorb	Hence 100 grains of solid chloride of sodium will absorb
I.	.0324 grain of NH_4O.	.1222 grain of NH_4O.
II.	.0233 do.	.0881 do.
III.	.0292 do.	.1097 do.
Mean	.0283 do.	.1066 do.

These numbers require a slight correction to make them absolutely true expressions for the absorbing power of chloride of sodium, because, in addition to the trifling excess unavoidably added in order to obtain the blue tint on the litmus-paper (which is so slight that it need not, and indeed could not, be regarded), the water in which the salt is dissolved exercises a certain amount of absorption. This is not, however, much ; the quantity of water contained in the above 100 grains of saturated solution making .0046 of a grain of ammonia (NH_4O), which would make the true amount absorbed by 100 grains of salt solution, .0237 of a grain; and that absorbed by 100 grains of solid salt, .0893 of a grain. This, however, will not affect the subsequent experiments.

But the amount of ammonia absorbed by this constituent, although really very considerable, and of great importance in an agricultural point of view, did not yet correspond to the apparent absorbing power possessed by the specimens of agricultural salt. The following comparative experiments were therefore made with the view of ascertaining the absolute amount of ammonia which these samples absorbed. The solutions used for these experiments were prepared by digesting great excess of the salt with cold water for some time, so as to approximate the manner of making the solution as closely as possible to that which would occur in nature. The experiments themselves were varied by diluting both the ammonia and salt solutions, without any very great difference of result.

* With regard to the delicacy of the litmus-paper here employed, I may state that a quantity of the ammonia solution containing .04 of a grain of NH^4O, being placed in an empty bottle, the paper was intensely blued almost immediately after its insertion.

Experiment.	100 grains of the solution of this salt will absorb	Hence 100 grains of the solid salt (contained in the aqueous solution) will absorb
Agricultural Salt, No. I.		
I.	.1479 grain of NH_4O.	.6207 grain of NH_4O.
II	.1517 do.	.6361 do.
III.	.1517 do.	.6361 do.
Mean	.1504 do.	.6309 do.
Agricultural Salt, No. II.		
I.	.1304 grain of NH_4O.	.4918 grain of NH_4O.
II.	.1349 do.	.5049 do.
III.	.1349 do.	.5049 do.
Mean	.1334 do.	.5005 do.
Agricultural Salt, No. III.		
I.	.1486 grain of NH_4O.	.5533 grain of NH_4O.
II.	.1527 do.	.5685 do.
III.	.1543 do.	.5746 do.
Mean	.1518 do.	.5654 do.

Now as soon as the solution of carbonate of ammonia is dropped into these salt solutions, there occurs (as might have been anticipated) a precipitation of the sulphate of lime which they contain as carbonate ; this must be attended with a corresponding fixing of the ammonia, the latter combining with the sulphuric acid to which the lime was previously united; and by this reaction, the immense difference observed between the absorbing power of these solutions and that of a solution of pure chloride of sodium would appear to be accounted for. Whether, then, by its own immediate agency, as in the case of manuring with gypsum, or by the intervention of the absorbent power of the chloride of sodium, the soluble lime-salt present is really the most powerful agent in the absorptive process—a fact which was still further demonstrated by the addition of a few drops of solution of chloride of calcium to some of the pure chloride of sodium solutions, to which, in the previous experiments, the maximum of ammonia solution had been added,—instant absorption, and consequently diminished action on the test-paper, was of course the result.

The absorptive power of the specimens examined ought therefore, if so dependent upon the amount of lime-salt, to be almost in the ratio in which that exists in their soluble portion. The subjoined table will, however, show a discrepancy in this particular :—

Composition of the portion soluble in water, calculated to 100 *parts.*

	No. I.	No. II.	No. III.
Sulphate of lime	4.234	1.203	1.474
Sulphate of magnesia	.256	.338	.336
Sulphate of soda.....	3.452	.884	1.773
Chloride of sodium	92.058	97.575	96.417
	100.000	100.000	100.000
Ammonia absorbed by 100 parts of the solid salt ...	.6309	.5005	.5654

If, now, we compare the quantity of sulphate of lime which these salts respectively contain with the amount of ammonia which they are capable of absorbing, we find no such proportion as might have been expected. This arises from the extreme insolubility of the sulphate of lime compared with the solubilities of the other constituents of the salt; and fresh lime-determinations in the solutions actually employed in the absorption experiments showed, that notwithstanding the different composition of the three salts, the amount existing in the solutions prepared as before described was very much the same. The other constituents, from their possessing a comparatively equal solubility with chloride of sodium, cannot be supposed to vary much; and the true composition of the salts contained in the solutions employed, as given below, will be seen to present a very close coincidence between the per-centage of lime-salt and of ammonia absorbed.

Real composition of the salts dissolved for the absorption experiments, calculated to 100 parts.

	I.	II.	III.
Sulphate of lime (determined)	1.356	1.039	1.182
Sulphate of magnesia.....	.264	.338	.337
Sulphate of soda	3.555	.886	1.779
Chloride of sodium.....	94.825	97.737	96.702
	100.000	100.000	100.000
Ammonia absorbed by 100 parts of the solid salt	.6309	.5005	.5654

We ought, then, to have an index to the absorbing power of a salt by a knowledge of the quantities of chloride of sodium and of soluble lime-salt which it contains; an equivalent of lime-salt fixing an equivalent of ammonia,—and the chloride of sodium, the per-centage which it has been above shown to absorb. Let us now apply this method of determination to the samples under experiment.

No. I.

Total number of grains of ammonia absorbed by 100 grains of salt	.6309
Deduct the absorbing power of 1.356 grain of sulphate of lime.....	.5187
	.1122
Deduct the absorbing power of 94.825 grains of chloride of sodium.....	.1000
	.0122

No. II.

Total number of grains of ammonia absorbed by 100 grains of salt.....	.5005
Deduct the absorbing power of 1.039 grain of sulphate of lime	.3973
	.1032
Deduct the absorbing power of 97.737 grains of chloride of sodium.....	.1041
	*

No. III.

Total number of grains of ammonia absorbed by 100 grains of salt	.5654
Deduct the absorbing power of 1.182 grain of sulphate of lime.....	.4519
	.1135
Deduct the absorbing power of 96.702 grains of chloride of sodium	.1030
	.0105

It will be seen that in Nos. I. and III. a slight excess of ammonia remains unaccounted for; this is partly, of course, due to an unavoidable excess which must

in every experiment be added ; but I have observed, that throughout the operation, even when the absorption is most active, and even after several hours' contact, there is yet a feeble tinge imparted to the litmus-paper when left in the atmosphere within the bottle for five minutes. This would seem to show, that at all stages of the process there is a certain amount of counteraction going on, and it becomes a great question whether this action—which appears trivial when we deal with a comparatively large amount of ammonia, as in these experiments—would not in practice nullify to a great extent, or at least diminish considerably, the absorbent power of this agent, when, spread on the surface of the soil, minute quantities only of ammonia came within the sphere of its action, and the absorption was distributed over a considerable portion of time.

I believe that this counteraction and liberation of ammonia may be traced to the solubility of the carbonate of lime in the absorbing liquid : upon the addition of the first few drops of the carbonate of ammonia solution to the solutions of the salts, the small quantity of precipitate which was produced was immediately and perfectly dissolved by agitating the liquid ; this was doubtless partly due to the excess of carbonic acid which was evolved from the sesquicarbonate of ammonia, but a considerable portion of the action must be attributed to another cause. It is some time since Professor Connell has shown, that, upon producing carbonate of lime by the action of carbonate of soda upon chloride of calcium in a medium of distilled water, the carbonate of lime so produced (if produced at all) is held in perfect solution.* I have found the same action to operate to a much larger extent in the case of a saturated solution of chloride of sodium : taking two solutions of chloride of calcium and carbonate of soda, of which equal bulks contained equivalents, and adding equal portions successively to a known quantity of a saturated solution of pure chloride of sodium, taking care to mix whichever was first added thoroughly with the solution before adding the other. I have obtained the following results, by which it is shown that a saturated solution of chloride of sodium dissolves $\frac{1}{5649}$ of carbonate of lime, or about five-and-a-half times as much as Professor Connell gives as the amount dissolved ($\frac{1}{31323}$) by the common water of St. Andrews. The chloride of sodium was of course perfectly freed from carbonic acid before trying the experiments.

Experiment.	100 grains of saturated solution of pure chloride of sodium will dissolve	Hence 100 grains of the solid salt will decompose?
I.	.0165 of a grain of carbonate of lime.	.0623 of a grain of carbonate of lime.
II.	.0181 do.	.0683 do.
III.	.0186 do.	.0703 do.
Mean	.0177 do.	.0669 do.

The addition of the solutions to the chloride of sodium was continued until a slight film of carbonate of lime was deposited upon the mixture standing for half-an-hour; a deduction was made for the excess added ; the numbers therefore represent the amount of carbonate of lime which can be permanently held dissolved by the chloride of sodium. I say this, because I believe that a far larger amount may be retained in solution for a limited time ; for if the first trivial precipitate is disregarded, twice or three times as much of the two solutions may be added without producing any such increase of the precipitate as ought to occur, if at that stage the chloride of sodium absolutely refused any further action. But this somewhat curious result I think of prosecuting further. It must not, however, be supposed that it is only on carbonate of lime in the nascent state (if the expression may be allowed) that the chloride of sodium exercises this power; if the two solutions are allowed to mix by pouring them simultaneously upon the surface of the salt solution, so as to produce there a stratum of recently precipitated carbonate of lime, the chloride of sodium will dissolve this with the utmost facility upon agitation. The clear solution may be boiled without any separation of carbonate of lime occurring; it is partly

* *Phil. Mag.*, S. 3, vol. xxxi., p. 124.

thrown down by boiling with carbonate of ammonia, partly also by boiling with ammonia, and apparently completely by oxalate of ammonia. Whether there exists in this solution chloride of sodium dissolving carbonate of lime, or chloride of calcium not decomposed by carbonate of soda, we have no present means of determining, although from its partial precipitation by carbonate of ammonia I should almost think that it existed in the latter form, since it is more rational to suppose that carbonate of ammonia, being a less permanent combination than carbonate of soda, should transfer its carbonic acid to chloride of calcium, taking hydrochloric acid in return, than that it should exert any action upon carbonate of lime dissolved as such. The idea of the considerable temporary solubility of recently-formed carbonate of lime, receives considerable support from a peculiar phenomenon which took place when I endeavoured to make carbonic acid determinations in the Worcestershire brine-springs. I adopted the ordinary process of adding to the water excess of ammoniacal chloride of calcium,—a very trifling precipitate occurred, which was attributed to the comparative absence of carbonates and carbonic acid; upon examining the bottles at home, however, their interior was covered with most beautiful crystals of selenite, of the most perfect forms,—some complete hemitropes. From their figure and size, these had evidently been deposited slowly; and I do not doubt now that the chloride of sodium at first prevented the precipitation of the carbonate of lime, then that the large quantity of sulphate of soda present parted with its sulphuric acid to the lime so dissolved (by degrees, as the chloride of sodium relaxed its solvent power); the liquid was soon saturated with sulphate of lime, and the surplus was thus gradually deposited. I need not say that the amount of carbonate of lime actually thrown down was quite insufficient to meet the requirements of the analysis; nor is this the only instance in which I have observed a similar result.

The results then at which we must arrive are, that agricultural salt is a most energetic absorbent of ammonia, both in virtue of its chloride of sodium and of its soluble lime-salt, and that the proportion of the latter especially most powerfully affects its action; but that at the same time its agency does not seem to be altogether a permanent one; it will collect the ammonia, but it is questionable whether it can retain it for any great length of time, because in the very decompositions which happen in order to render the ammonia more stable, salts are formed which have a direct tendency to liberate ammonia from its more fixed combinations. It may, however, retain it quite long enough for agricultural purposes; if the young plants are there ready to receive it, its state of gradual liberation may be for them the most advantageous possible; and to this conclusion all experiments on the large scale appear most obviously to tend. It is described as an excellent check to the too forcing power of guano; and from M. Barral's experiment we see that it either prevents the too rapid eremacausis of the latter, or stores up the ammonia as it is formed. As a manure for growing crops, all experience and all theoretical considerations therefore show it to be most valuable; but when employed to mix with manure heaps which have to stand for considerable periods of time, theory would pronounce, as practice has in many cases done, that its power of retaining ammonia under those circumstances is at the best doubtful.—*Philosophical Magazine.*

ON THE PRODUCTION OF ALCOHOL FROM COUCH-GRASS.

(*Triticum repens.*)

BY M. RABOURDIN OF ORLEANS.

In 1811, Dr. Leroi published a paper on the useful application of the subterraneous creeping root of couch-grass, wherein he clearly proved that it was capable of yielding a liqueur of good quality and a panifiable farina.

These investigations, which were presented to the Agricultural Society, did not lead to any industrial application.

Last year a Chemist in Paris, M. Hoffman, again directed attention to the possibility of preparing a palatable liqueur from this root which grows so abundantly on every soil, injuring cultivated plants, and which at present is only thrown away or burnt in the fields as a nuisance.

According to Dr. Leroi and M. Hoffman, the root, conveniently cut, should be infused in boiling water for some hours and the liquor separated by pressure.

Some common yeast is then added to the liquor, and the whole fermented at a

temperature of 77° Fahr. The alcohol is afterwards removed by distillation. This manner of operating is very simple, but the product obtained is very small.

The quantity of sugar extracted from couch-grass by simple infusion is very variable.

If the plant be devoid of young shoots the sugar will be entirely absent; but, on the contrary, if buds are being developed the infusion will be comparatively sweet.

This arises from the circumstance that the root contains a fecula which nature employs as nutriment for the young shoots, which, however, is only effective in the presence of diastase, which is produced during germination. Through the interesting experiments of MM. Payen and Persoz, we know that germinating grains contain a substance capable of converting fecula into grape sugar or glucose, which is carried away in the sap, and serves as nutriment to the vegetable embryo. This substance has received the name of Diastase.

The circumstance of the subterranean roots of *Triticum repens*, containing a fecula, was well-known, but no one that I am aware of ever attempted to make use of it in the production of alcohol. This fecula can be converted into sugar in two ways. One consists in collecting the roots during germination, and extracting the sugar by maceration.

Simple as this may appear it is difficult to put it in practice. One bud may develop and shoot out to the extent of one inch to one inch and a half, while the other buds on the same branch appear quite dormant. The germination is in fact too irregular to admit of any uniform results being obtained. The other process consists in saccharifying the fecula in the ordinary way with sulphuric acid. The following is the process I adopt:—10 kilogrammes (26lb. troy) of common couch-grass, *Triticum repens* (*Cynodon dactylon* or *Avena elatior* would do as well), is first rinsed to remove the adhering earth to some extent, and cut to a convenient size; it is then boiled in a mixture of 20 litres (four gallons three pints) of water and 200 grammes (six ounces) of sulphuric acid, for about three hours, the loss from evaporation being compensated for by the addition of more water. 200 grammes (six ounces) of lime previously mixed with one litre (1 pint 15 oz.) of water is then added, and the whole subjected to pressure. About 20 litres (four gallons three pints) is thus obtained of a saccharine liquid indicating 7° degrees by the areometer, and containing two kilogrammes (4lb. 6oz. avoir.) solid matter in solution. An ounce of yeast is then added to the 20 litres of liquid, and the whole fermented at 77° Fahr. An abundant disengagement of carbonic acid takes place, and the process is finished in about 36 or 40 hours.

The liquid which indicated at first 7° goes down to $2\frac{1}{2}$°, and then contains only 800 grammes (1lb. 8oz. avoir.) of solid matter. From the two kilogrammes (4lb. 6oz. avoir.) of solid matter contained in the solution before fermentation, 1200 grammes (2lb. 9oz. avoir.) have therefore disappeared. This quantity represents the sugar obtained from 10 kilogrammes of fresh couch-grass. This root yields, therefore, 12 per cent. of glucose, or grape sugar.

Upon distillation the liquor yields two litres ($2\frac{1}{2}$ pints) of an alcoholic liquid, indicating 35° degrees of Gay Lussac's alcohol metre, or, in other words, it contains 70 centilitres of absolute alcohol, or 80 centilitres (22oz.) of rectified spirit. To illustrate the superiority of this process I made the following experiment:—

Ten kilogrammes (26lb. troy) of the same couch-grass was treated with water alone, without any acid; 20 litres of decoction was thus obtained. The liquor indicated 3° by the areometer, and contained in solution 1200 grammes (2lb. 9oz. avoir.) of solid matter.

After fermentation the liquor had lost only one degree of the areometer, and contained 900 grammes (1lb. 11oz.) of solid matter in solution. It contained, therefore, only 300 grammes of glucose, a quantity which is just one quarter of that obtained by the other process.

Upon distillation it yielded a liquid indicating 9° degrees of the alcohol metre, which is equal to 18 centilitres of absolute alcohol, instead of 70, as obtained by the former process.

The following would be the commercial method of working:—

The couch-grass is placed in a tub on a perforated shelf, similar to the steeping vats used in breweries. As much water is then added as will cover the whole mass. An amount of sulphuric acid is then added, equal in weight to the 200th part of the roots employed. It is then heated to the boiling point by a jet of steam, at which

temperature it is kept for three hours. Sufficient milk of lime is then added to neutralize the acid, the liquid strained off and fermented with yeast; lastly, it is only necessary to submit the fermented liquor to distillation, which may be effected with great simplicity and perfection in the apparatus used at the spirit distilleries. —*Journal de Pharmacie.*

ON THE PREPARATION OF ARTIFICIAL OIL OF CASSIA.

BY M. A. STRECKER.

Commercial oil of cassia (oil of China cinnamon) consists of several substances, of which the principal is hydruret of cinnamyle (C_{18} H_8 O_2), or aldehyde of cinnamyle.

A few years ago I stated that styrone, produced by the action of caustic potash on liquid styrax, might be considered as the alcohol of cinnamic acid. M. Wolff's experiments also show that styrone can be converted into cinnamic acid by the employment of chromic acid. It therefore seemed probable that, by the use of a less powerful oxydizing agent, the styrone could be converted into cinnamic aldehyde (oil of cassia). This may be effected by moistening spongy platinum with fluid styrone, and exposing the mixture to the air. After a few days the odour of styrone is replaced by that of oil of cassia. The hydruret of cinnamyle may be separated by bisulphite of potash, which forms crystallizable salts with all aldehydes.

The crystals are purified by washing with ether. By treating them with oil of vitriol an oily liquid separates, possessing the smell of oil of cinnamon in the highest degree.

The crystals are sparingly soluble in alcohol, and by exposure to the air are gradually converted into cinnamic acid. They are easily soluble in nitric acid; the solution, however, speedily deposits a crystalline mass of nitrate of the hydruret of cinnamyle.

The change which the styrone undergoes may be expressed as follows:—

$$\underbrace{C_{18}\ H_{10}\ O_2}_{\text{Styrone.}} + O_2 = \underbrace{C_{18}\ H_8\ O_2}_{\text{Hydruret of Cinnamyle.}} + 2\ HO.$$

Annales de Chimie.

ON THE ARTIFICIAL PRODUCTION OF ESSENCE OF MUSTARD.

BY MM. BERTHELOT AND S. DE LUCA.

Essential oil of mustard has been the subject of numerous important investigations for the last thirty years. Its remarkable composition (being formed of carbon, hydrogen, sulphur, and nitrogen), the variety of compounds it is capable of forming, and its being produced together with oil of garlic from a number of cruciferous plants—these with its physiological effects have not failed to attract the attention of chemists. Without recalling the experiments of MM. Thibierge, Horneman, Boutron, Robiquet, Garrot, Fauré, Guibourt, Henry and Plisson, Fremy, Simon, Wittstock, Aschoff, Bussy, &c., it is sufficient to mention those of MM. Dumas and Pelouze in 1833, since it was by them the density of its vapour and its principal properties were ascertained, together with the discovery of that beautiful crystalline body, Thiosinnamine, produced by the action of ammonia on oil of mustard. This reaction is a distinguishing character of this oil.

Since the above period a number of experiments have been published by MM. Lœwig, Weidman, Will, Wertheim, Gerhardt, Winckler, Hlasiwetz, Zinin, Hinterberger, Pless, &c. These investigations, and especially those of Wertheim, have thrown the greatest light on the essential oil of mustard. M. Wertheim ascertained its composition to be C_8 H_5 N S_2, and considered it to be a combination of oil of garlic (C_6 H_5 S) with hydrosulphocyanic acid:—C_8 H_5 N S_2=C_6 H_5 S+C_2 N S.

It was the knowledge of these facts which enabled us to produce oil of mustard without using any principle resembling those extracted from the cruciferæ, but by taking glycerine as our starting-point.

In a former article, presented by us to the Academy, we stated that glycerine, when treated with iodide of phosphorus, forms iodureted propylene C_6 H_5 I_1, which only differs in composition from oil of garlic, in iodine taking the place of sulphur. If, therefore, sulphur could be substituted for iodine, and the resulting compound

combined with hydrosulphocyanic acid, essence of mustard would be the result. This may be effected in one operation by treating the iodide of propylene with sulphocyanide of potassium:—

$$C_6 H_5 I + C_2 N K S_2 = C_8 H_5 NS_2 + K I.$$

When conducted in a closed vessel at 212° Fahr., the reaction is complete in a few hours, essence of mustard and iodide of potassium being the principal products of the process. The liquid portion possesses the well-known properties of essence of mustard. It produces the same pungent effect upon the eyes and skin; it boils at the same temperature, and treated with ammonia it yields Thiosinnamine:—

$$C_8 H_5 NS_2 + NH_3 = C_8 H_8 N_2 T_2$$

The composition of which is as follows:—

C=40.9. H=7.0. N=23.0. S=28.0.

The formula being $C_8 H_8 N_2 S_2$, requires by calculation—

Carbon 41.4 Hydrogen 6.9 Nitrogen 24.1 Sulphur 27.6.

This Thiosinnamine possesses, therefore, the same composition and properties as the Thiosinnamine prepared from the natural essence, and also according to our determinations the same crystalline form. The production of essence of mustard from ioduretted propyline clearly shows that oil of garlic ($C_6 H_5 S$) can be derived from propylene ($C_6 H_6$), one of the carburets corresponding to the alcohols. Essence of garlic is in fact sulphuret of propylene, one atom of hydrogen being replaced by one of sulphur; and essence of mustard is the sulphocyanide of sulphopropylene. These results, if more extended, may possibly enable us to produce similar compounds from other carburets analogous to propylene, and we intend making some experiments with that view.

We may, perhaps, be allowed to point out the relation which our experiments prove to exist between glycerine and essence of mustard, showing that this essence can be obtained from neutral fatty substances, which are so abundant in vegetables, and particularly in cruciferous plants; a circumstance which may perhaps enable us to throw some light on the origin of the natural essence of mustard.—*Journal de Pharmacie.*

RESEARCHES ON OXYGEN IN A NASCENT STATE.

BY M. AUGUSTE HOUZEAU.*

In considering one of the more remarkable cases in which oxygen assumes a nascent state, namely, that which occurs in the preparation of oxygenated water, I have been led to suppose that if by a happy doubling of the two atoms of oxygen, which are united to barium to form the binoxide, I succeeded in setting free the extra atom out of contact with any oxidizable substance, the molecule would in its disengagement show itself to possess in a high degree, oxydizing properties. It is this, in fact, which occurs when monohydrated sulphuric acid is allowed to react at a low temperature upon binoxide of barium. Of the various apparatus which I have employed in the laboratory of M. Boussingault for the preparation of nascent oxygen, the most simple consists of a tubulated globe, the narrower neck of which is fitted with a conducting-tube passing under a bell-glass filled with water. The sulphuric acid being first poured in, it is sufficient to drop into it the earthy superoxide in small fragments, rapidly closing the neck of the globe with a cork. The disengagement of gas is not long delayed, and it proceeds the more rapidly the more the mixture becomes heated. In certain cases it is necessary to favour the reaction by plunging the globe into a water-bath at 122° to 140° Fahr., as in other cases it is indispensable to moderate it by the use of cold water.

Nascent oxygen is a colourless gas, possessing a strong odour; it should be respired with care, as introduced into the system too largely, it gives rise to nausea, which may be succeeded by vomiting. Its odour, which at first is not repulsive, becomes insupportable when it has been smelt many times. Its taste suggests a little that of lobster.

Heated to about 167° Fahr., or exposed to solar light, it loses all its active properties. In the presence of water, and at the ordinary temperature of the air, it

---

* *Journ. de Pharmacie et Chimie.* June, 1855.

oxydizes most of the metals, even silver, superoxydizes in general the metallic protoxides, and transforms also directly arsenious, into arsenic acid, &c. The alkalis (potash, soda, lime, baryta) and the acids (sulphuric, phosphoric, nitric) react strongly upon it. Even ammonia, in contact with nascent oxygen, undergoes a great modification; its elements are truly burned, the result of the combustion being a nitrous compound. In fact, it is only necessary to pass into a bell filled with the odorous gas, a rod of glass wetted with a solution of ammonia, when the vessel is instantly filled with abundant vapours of nitrate of ammonia.

Phosphoretted hydrogen, not spontaneously inflammable, and which we know is unaltered at 68° Fahr. by ordinary oxygen, burns on the contrary with the emission of light in the nascent gas.

Lastly, hydrochloric acid dissolved in water cannot resist the energetic affinity of active oxygen; its elements are dissociated in consequence of the combustion of the hydrogen, and the chlorine set free will dissolve gold leaf placed in the modified acid.

Nascent oxygen is thus a *chloridizer* in the sense that chlorine is an *oxidizer*, and in fact, it is to this remarkable power of combustion that the metallic superoxides owe their faculty of causing the disengagement of chlorine under the influence of hydrochloric acid.

The odorous gas reacts yet more rapidly on iodide of potassium, the iodine of which it sets free; it spontaneously decolourizes the tinctures of litmus, cochineal, and logwood, sulphate of indigo, &c., thus manifesting a power which even chlorine can hardly equal. Porous bodies absorb it, and also singularly modify it, since by merely passing it slowly through a glass tube filled with asbestos, spongy platinum, lint, carded cotton, strips of flannel, or the like, the odour and oxydizing properties of the gas are destroyed.

Although from the properties just described, it would not be possible to confound the nascent gas with ordinary oxygen, I have nevertheless thought that their differences would be still more apparent by a comparative statement of their respective properties; thus:—

Comparison of the general properties of *Ordinary Oxygen* and of *Nascent* or *Active Oxygen*, both being in the free state and at a temp. of 59° Fahr.

	ORDINARY OXYGEN.	NASCENT OR ACTIVE OXYGEN.
	Colourless, inodorous, insipid gas	Colourless, very odorous gas, having the taste of lobster.
Ammonia	.....	Burns it spontaneously, transforming it into nitrate.
Blue Litmus.....	No rapid action	Decolorizes it rapidly.
Silver	Does not oxydize it.....	Oxydizes it.
Phosphoretted Hydrogen Gas	No action	Instantly burns it with the emission of light.
Iodide of Potassium	Does not decompose it	Acts rapidly upon it, setting free the iodine.
Hydrochloric Acid...	No action	Decomposes it, setting free the chlorine.
	Is a feeble oxydizer.....	Is a powerful oxydizing agent and an energetic chloridizer [*chlorurant*].
	Very stable at all temperatures	Stable at 59°; is destroyed at about 167° Fahr.

Binoxide of barium is not, however, the only body which can thus disengage active oxygen, other oxygenated substances having also afforded it to me under certain circumstances.

When one considers in their *ensemble* the numerous chemical reactions to which oxygerated compounds give rise, and which alone constitute the greatest part of the metamorphoses of which Chemistry is the study, one may always recognize in *combined* oxygen that increased energy which distinguishes free oxygen in a nascent state, and which the latter [usually] ceases to possess immediately it is isolated from its combinations: an inactivity the more characteristic, since it becomes a property also of the *odorous* gas, when the latter has been subjected to the influence of heat or of light, or to the contact of certain substances with which it forms no union. It is thus that arsenious acid, unalterable by ordinary oxygen, is directly oxydized by free nascent oxygen, in the same manner as oxygen itself operates in the state in which it exists in nitric acid or in water decomposed by chlorine.

The case is the same with hydrochloric acid, which, undergoing no alteration from contact with ordinary gaseous oxygen or from the nascent gas if previously heated up to 176° Fahr., acquires, on the contrary, the power of dissolving gold in the presence of nitric acid or of the binoxides of barium, manganese, lead, &c., or of certain oxygenated salts, exactly in the same manner as in the presence of free, active oxygen, as mentioned above.

Hence the idea of the pre-existence of nascent oxygen in combinations is that which I wish to enforce in this paper. Moreover, it must be borne in mind that the ordinary methods employed to liberate oxygen are scarcely of a nature to favour the emission of the gas in its primitive state, since they are based upon the employment of certain agents, such as caloric, light, and catalytic force, capable themselves of destroying the activity of nascent oxygen. Thus, it appears that in calcining the peroxides of manganese or of barium, or the various oxygenated salts, such as chlorates, chromates, &c., it is impossible to obtain from them *active* oxygen, and even when Priestley, in his memorable experiment of the 1st of August, 1774, succeeded in decomposing the *Mercurius præcipitatus per se* (binoxide of mercury) by heating it in the burning focus of a lens, he could but set at liberty a degenerated principle, and the gas which he designated *dephlogisticated air*, which name Lavoisier, upon the creation of chemical language, transformed into *oxygen*, was none other than the hypothetical oxygen of modern chemists, modified by the disturbing forces employed at that period by the illustrious English philosopher.

ON THE CONSTITUTION AND PROPERTIES OF OZONE.

BY THOMAS ANDREWS, M.D., F.R.S.,
Professor of Chemistry in Queen's College, Belfast.

The conflicting views which have so long existed as to the true constitution of ozone, induced the author to undertake a careful investigation of the subject, particularly as he had reason to doubt the accuracy of the only quantitative experiments which have yet been made to elucidate this difficult question. According to the experiments referred to, two substances have been confounded under the name of Ozone, one a compound body having the formula HO_3, the other an allotropic variety of oxygen. To ascertain whether, in conformity with this statement, ozone obtained in the electrolysis of water contains hydrogen as a constituent, the author made two series of experiments. In the first series he followed nearly the same method of investigation by which its compound nature is supposed to have been established, but modified so as to avoid a source of error, which, if neglected, vitiates altogether the results. Electrolytic oxygen, unless very great precautions be taken, is always accompanied by a small but appreciable quantity of carbonic acid, which is liable to be partially absorbed by the potassa set free when a neutral solution of iodide of potassium is decomposed by ozone. By adding a little hydrochloric acid to the solution of iodide of potassium before the commencement of each experiment, this error may be avoided.

The method of performing the experiment was to conduct a stream of electrolytic oxygen through a compound apparatus previously weighed, which contained on one side an acid solution of iodide of potassium, and on the other sulphuric acid; the former to decompose the ozone, the latter to prevent the escape of moisture. The increase in weight of this apparatus gave the entire weight of the ozone; the iodine set free, when reduced to its equivalent in oxygen, the weight of the active oxygen. The precautions to be taken in conducting this experiment are fully described in the communication.

The following are the numerical results of five experiments performed according to the above method :—

Volume of electrolytic oxygen. litres.	Increase in weight of compound apparatus. grm.	Active oxygen deduced from iodine set free. grm.
10.20	0.0379	0.3386
2.72	0.0107	0.0100
2.86	0.0154	0.0138
6.45	0.0288	0.0281
6.80	0.0251	0.0273
	Total..... 0.1179	0.1178

The agreement in these numbers proves that the active oxygen is exactly equal to the entire weight of the ozone, and is therefore identical with it.

In the next series of experiments the author shows that no water is produced in the decomposition of electrolytic ozone by heat. Large quantities of electrolytic oxygen, containing from thirty-eight to twenty-seven milligrammes of ozone, were decomposed by heat, but no water was obtained in a weighed absorption apparatus, in which the gas was exposed, not only to the action of sulphuric acid, but was also passed through a tube containing anhydrous phosphoric acid.

Having confirmed by new experiments the fact that ozone is formed by the action of the electrical spark on pure and dry oxygen, the author proceeds to institute a comparison between the properties of ozone derived from different sources. These he finds to be in every respect the same. Thus ozone, however prepared, is destroyed, or rather converted into ordinary oxygen, by exposure to a temperature of about 237° C., and catalytically, by being passed over peroxide of manganese, no water being formed in either case; it is not absorbed by water, but when sufficiently diluted with other gases, is destroyed by agitation with a large quantity of water; it is also, contrary to the common statements, destroyed by being agitated with lime-water and baryta-water, provided a sufficient quantity of those solutions be used; it has always the same peculiar odour; it bleaches without producing previously an acid reaction; it oxydizes in all cases the same bodies, &c.

From the whole investigation the author draws the conclusion, "that ozone, from whatever source derived, is one and the same substance, and is not a compound body, but oxygen in an altered or allotropic condition."—*Proceedings of the Royal Society*, vol. vii., No. 14.

PROCESS FOR THE PREPARATION OF SOLUBLE CITRATE OF MAGNESIA.

BY M. E. ROBIQUET.

TAKE Citric acid, 1 kilogramme
Carbonate of magnesia, 630 grammes
Boiling water, 350 grammes.

Reduce the citric acid to coarse powder, and dissolve it in the boiling water. When the solution shall have cooled, and before it crystallizes, pour it into a large stone-ware pan, and by means of a sieve allow the magnesia to fall rapidly over its surface, taking care not to stir it. The reaction takes place gradually; when it appears to have ceased, which is easily observed, mix thoroughly and as rapidly as possible, while the paste remains soft and ductile. The utmost care must be taken that the mass do not heat, for if the temperature suddenly rises, it is a certain sign that the citrate of magnesia is undergoing that molecular change which causes it to pass into the *insoluble variety*, and the product is lost. Thus for better insuring success, it is not useless to set the pan in a tub of cold water, and constantly to bring the citrate in thin layers into contact with the sides of the vessel. When this manipulation is over, the whole product should be left at rest for twenty-four hours; the swelled-up mass of citrate should then be divided into fragments and dried in a stove at a heat not over 60° to 68° Fahr.

It will thus be seen that the whole secret of the process is to employ the smallest possible quantity of water, and to avoid an elevation of temperature at the moment of combination, for this disengagement of heat would be the result, not of the chemical action of the citric acid on the carbonate of magnesia, but simply of the change of condition which the citrate would undergo in passing from the soluble modification to the insoluble.—*Journ. de Pharmacie d'Anvers*, Aug. 1855.

ON THE GELATINIZATION OF ETHER.

BY M. GRIMAULT.

AT a time when the question of local anæsthesia attracts more and more attention, I think it may be useful to make known to practitioners a very simple method of *gelatinizing* ether, which avoids the numerous inconveniences resulting from its great volatility, allows of its action being localized, as well as prolonged as much as

may be desirable, without requiring constant surveillance. By the use of the new preparation, we may more easily judge of the anæsthetic action of ether apart from its refrigerant effect, this latter being almost null even when the jelly is employed in the free air.

If we put together into a stoppered bottle, four measures of ether with one measure of white of egg, and briskly agitate them together, the albumen will be soon seen to swell considerably, and by degrees to absorb the entire quantity of ether forming with it a thick collodion, which is soon transformed into an opaline, trembling jelly, detaching itself from the sides of the bottle without separating into the two ingredients of which it is constituted. This jelly, much more easily operated with than ether, and without any adherence, is spread with the greatest facility, disengaging but slowly the volatile liquid of which the major part of it is formed. Applied to the skin, and covered with a band of cloth, or still better of caoutchouc, it speedily causes rubefaction without producing by its contact any symptom of vesication. When it begins to dry, a new layer may be applied, and there may thus be submitted to the prolonged action of ether, either exposed to the air or covered, a part of the body more or less extensive, by the same means that are employed in the administration of a cataplasm or a sinapism.

The jelly ought to be prepared as required, for the action of ether on albumen continues some time, bringing about by little and little a solidification more and more complete.

By immersing the bottle in water at 158° Fahr., an almost instantaneous solidification is obtained, without the separation of the ether.

1. The proportion of four parts of ether is the strongest which I have succeeded in absorbing by one part of albumen. In fact, to prepare the jelly more rapidly, it would be better to increase a little the proportion of albumen.

2. For the preparation of a fine and homogenous jelly, it is requisite to use ether that is pure, or at least such as is free from alcohol and acid. This may be obtained from the ether of commerce by agitation with water and magnesia.

3. If circumstances require, various substances may be dissolved in the ether—as, for example, cyanide of potassium, camphor, morphia or conia, &c.—and the gelatinization may afterwards be effected.—*Journ. de Chimie Médicale*, Sept., 1855.

NEW FILTER.

Dublanc* recommends for rapid filtration, a wire frame made in the shape of a funnel of tinned or silver wire, in such a manner that the alternate folds of a ribbed filter fit upon the wires. A second wire frame fitting against the other folds, is placed inside for the purpose of holding the filter in its place.

TANNIC ACID A REMEDY FOR CHILBLAINS.

BY PROF. BERTHOLD.

The extract obtained by boiling 1½ oz. of pounded nut-galls with 0.5lb. of rain-water, has an excellent action upon chilblains. The decoction may be employed as a bath, or laid upon the swellings by means of rags. The itching and burning disappear in two or three days. In old cases the remedy must be continued longer. Oak-bark may also be employed ; a mixture of 1lb. of oak-bark and 2lbs. of water being applied as a poultice. This remedy must not be used with broken or festering chilblains.—*Göttinger Gel. Auz. Polytechn. Central Blatt*, 1855.

REMARKS ON THE CRYSTALLINE STRUCTURE OF IRON IN REFERENCE TO THE NASMYTH GUN.

The alleged failure of the Nasmyth gun has called the attention of scientific men to the changes which iron undergoes by use, and to the causes which accelerate its passage from the fibrous to the crystalline state. Dr. Noad, during a visit to the Welsh iron mines, has tried some experiments, and communicated the results obtained

* *Dingler's Polytechnisches Journal.*

to the public,—results of deep interest, considering how extensively iron is now used for bridges, cables, and supports. Dr. Noad says :—"The tendency of iron to pass from the fibrous or tough to the crystalline or brittle condition, is promoted by various causes; everything, in fact, which occasions a vibration among its particles has this tendency." He then describes his experiments, which prove that the metal may be made to pass from one state to the other :—"Seeing a large quantity of iron chain lying about, and learning that, though scarcely worn, it had been laid aside in consequence of the breaking of some of the links, I examined several from different parts of the chain. I found that a single smart blow with a hammer was sufficient to snap the metal, the fracture of which was crystalline, and its brittleness such that it could, without difficulty, be broken into small pieces under the hammer. I now heated strongly in a forge some of the broken links, and allowed them to cool very slowly underneath a bed of fine sand. After the lapse of twenty-four hours they were examined ; the metal was found to have recovered its tenacity, it could no longer be broken to pieces under the hammer ; and when at length, after repeated heavy blows, it did partially yield, the texture of the metal was found to be perfectly fibrous—every trace of a crystalline structure had disappeared." Dr. Noad thinks that the iron of the Nasmyth gun has been crystallized by continuous hammering, and he suggests that its fibrous condition may be restored by annealing. But this is scarcely the most interesting question raised. How about the iron bridges ? Are they passing into that crystalline condition in which they will be as strong as glass—and no stronger ? How, again, about our chain cables ? Are our leviathans of the deep floating in a fanciful security, trusting to iron ropes that will snap as a child's thread in the day of storms ?—*Athenæum.*

INTERESTING DISCOVERIES.

At the Annual Meeting of the Somerset Archæological Association, which extended over three days, it was stated that the remains of a rhinoceros and other extinct animals had lately been discovered in the neighbourhood of Taunton, in connexion with the trees of a forest in which they lived. These trees were of existing species, viz., oak, alder, hazel, &c., thus showing that the climate of the country when it was inhabited by the rhinoceros, bear, tiger, elephant, hyena, &c., was much the same as it is now. An important paper was also read by the Rev. W. A. Jones, M.A., describing the remains of ancient British hut circles, which he had brought to light on Croydon Hill, in the western part of Somerset. The outlines of several of the cabins were perfect, and some of the inhabitants in the neighbourhood had used a great quantity of the stones to drain the adjoining fields. In another paper the author gave a description of the discovery of the calcareous skeletons of corals of the Devonian series, met with in the Quantock Hills. These were supposed to be the remains of coral reefs, akin to those which are found in the present day.—*Times*, Aug. 29.

CHARCOAL AS A DEOXIDIZER.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—As charcoal from its singular properties has excited of late an immense deal of interest, any fact connected with that subject not generally known, will perhaps not be thought unworthy of notice in the *Pharmaceutical Journal.*

It is well known that charcoal has the power of condensing within its pores large quantities of the gases; and also of abstracting saline and metallic salts from their solutions. In addition to which, it also possesses the property of reducing the salts of gold; which may be seen by the following experiment that I have recently made:—

Into a bottle nearly filled with a solution of chloride of gold of a deep yellow colour, was placed a lump of wood charcoal. After a few hours metallic gold began to appear, and in about ten or twelve days the whole of the chloride had been withdrawn from the liquid and deposited on the charcoal in the metallic state. Proto-

chloride of tin was then added to the solution, but no change whatever was produced.

According to Dr. Stenhouse, charcoal is a powerful oxidizer; but in this case I conceive it must be viewed as a powerful deoxidizer.

Should any one repeat the experiment, they probably would have some doubt whether the reddish deposit is really the pure metal, or the metal in some state of combination. But if they will only rub the surface with some hard body, their doubts will be speedily set at rest by the brilliant polish produced.

Sept. 14*th*, 1855. J. Robbins.

THE POSITION AND PROSPECTS OF DISPENSERS IN THE CRIMEA.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

It seems to be the anxious desire of all now to promote the welfare and proper organization of every department connected with the army, and as publicity tends to bring about a remedy for any defects, a few remarks may not, therefore, be deemed inapt to point out some of the grievances which I conceive are attended with injustice to one department of the Medical Staff, viz., the Dispensers.

At the commencement of, and during the war, from time to time as need required, gentlemen were engaged in the Medical Department whose duties were those of Dispensers of Medicine. The appointment, so far as regards rank and pay, is similar to that of an Assistant Surgeon, but the position differs widely. The greater number of men employed in this branch of the service have duties assigned to them which might be described as those of a Drug Commissariat Clerk or a Thames-Street-Druggist's Warehouseman. Many, it is true, I am sorry to add, are not capable of discharging the duties of their office as competently as men holding the latter situation; but this is no reason, as I contend, that those who are really capable to discharge the duties of a Pharmaceutist should suffer for the ignorance or incapabilities of others.

The object of the Army Board no doubt is to have efficient men, but unless some inducement be held out for future advancement, how can they expect that any but an inferior class will volunteer on such service, at the risk of health and life, not to mention the great privations necessarily attendant upon a campaign in such a place as the Crimea.

Instead, however, of any prospect of advancement, we are most likely to retrograde. If it were intended that the duties should always be merely mechanical, such as any hospital sergeant of six months' standing might perform, why did the Medical Board appoint men in such a position *with* the nominal *rank of an Assistant Surgeon* without a chance of advancement, when they could have obtained men to perform such work with no other rank than that of a *non-commissioned officer?*

Many of those out here now in this department were induced to relinquish good appointments at home, which might have led to advancement, under the erroneous supposition that, by dint of application and ability, they might ultimately obtain a reward commensurate with their exertions more speedily than at home. However, they have been grievously mistaken; for if a man be possessed of ever so great talent, in this department he has nothing to look forward to by way of promotion.

The Commissariat and Purveyor Departments differ widely from ours in this respect. Men who are willing to exert themselves and diligently discharge the duties of their offices with zeal and efficiency, have the satisfaction to know that the chief of their respective departments will recommend them for promotion. Not so with the unfortunate dispensers. It is true, we possess a chief, but there is no one to recommend us, and, even if there were, I believe we should remain in *statu quo.*

The difference in foreign nations in this department is considerable. They possess their colleges for the Pharmacien, where he studies before he can pass his examination; after which, he is *permitted* to rise, according to ability and service. Look at the way matters are conducted with them. We send to England for distilled water!—whereas they carry portable laboratories which enable them to furnish it themselves, *and to make many preparations which we import at a great expense.*

In consideration of several of our best men having given up their appointments in disgust, and knowing several more are about to follow, I have been led to make these

remarks for the information of those gentlemen who are anxious to offer their services to fill up the vacancies occurring, that they may not be misled as we were as regards position and probable advantages.

Hoping the above communication will point out the injustice we are suffering from, and cause the authorities to exert themselves to find some remedy for the defect, I have the honor to be, Sir,

Your most obedient servant,

The Monastery of St. George's Hospital, Crimea, Sept. 6, 1855. JOHN W. N. BREWER, *Dispenser of Medicine among Medical Staff.*

[We appreciate the object and intention of our Correspondent, and thank him for directing attention to the subject; but he has not very satisfactorily stated his case. If it be his desire that a Dispenser of Medicines in the army should, upon his being found faithful and competent for the discharge of that duty, be promoted to the office of an Apothecary, this would not be reasonable, as the "Apothecary" in the army is a medical practitioner, having, and being capable of performing, functions for which the Dispenser of Medicine is not qualified. It is desirable that the office of Pharmaceutical Assistant or Dispenser, distinct from that of the so called "Apothecary," should be recognized and regularly introduced in the army. This concession or innovation is of recent origin, and the appointment of Dispensers to serve in the Crimea was an experiment, the success of which will in a great degree depend on the conduct and efficiency of the parties so appointed. But our Correspondent complains that the British Dispensers are not admitted to the social *position* of the Apothecaries, although nominally on a par with them in rank and salary; while the foreign Pharmacien, *having obtained a regular qualification in some college*, is in a more advantageous position, with a prospect of promotion. He admits that many of our Dispensers are very far from qualified; in other words, that the qualification where it exists *does not belong to the class*, but is due to the personal exertions and merit of certain individuals; and yet he complains that *the class* is not raised to the *position* to which it would be entitled if all the individuals possessed a professional qualification. Under the circumstances which he describes, he can scarcely expect the Dispensers of Medicine to be placed in a *position* equal to that of professional men or officers in the army; and his remark on the foreign Pharmacien clearly points out the remedy for all the evils and disadvantages of which he complains.—ED.]

STATISTICS OF APOTHECARIES AND DRUGGISTS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—In the Student's number of the *Medical Times* is a table showing the "number of practitioners in medicine, according to the census of 1851, in Great Britain, with the respective ages." As many will not see it, a few remarks (should you think them worthy your notice) may not be uninteresting. There were, it appears, in all, 15,162 surgeons or apothecaries, and 15,325 "druggists," out of which latter the somewhat startling number of 3630 were under twenty years of age. Now, if we look to the number above fifty and under fifty-five, we shall find it diminished to 567, or a fraction more than the twenty-seventh part of the whole; so that out of every 27 chemists and druggists in the United Kingdom, *one* only was found to have attained the age of fifty and upwards;* whilst the surgeons, though rather less in all, were more than double that number at the same age. May we not ask, then, what is the cause of so rapid a decrease in proportion to the increase of years? Is it because the business is of so profitable and tempting a character, that the great majority join it successfully, and so, in due course, retire with an ample competence for life? or is it, on the contrary, that it is of so *un*profitable a character, that they are found to relinquish it, either in despair, seeking some other employment, or (from anxiety, confinement, and the like), in obedience to the laws of nature, journeying to that "undiscovered country from whose bourn no traveller returns?" Surely, Sir, it behoves us individually to look around for a reply; and, as we learn from the above simple calculation that there is evidently something in the business which does not "run smoothly," we should, I think, endeavour to do all in our power to remedy that which is so obviously opposed to its success. When the advantages of a theoretical as well as practical knowledge of the business becomes better known and appreciated, then will the many who now join it (*with no desire for qualification*)

be induced to pause, and to give place to the carrying out of those conditions upon which success depends; a shortened duration of labour, and consequent recreation of mind and body, will follow in the train, and health and prosperity be planted there, where now, perchance, "war, death, or sickness" doth "lay siege."

I am, Sir, yours very respectfully,

14, *Albany Street, September* 24. W. Willmott.

[* The number 567 is stated to refer to those above fifty and *under fifty-five, not* to those who are *fifty and upwards.* This makes a slight difference in the calculation. We may also observe that the total number of druggists, 15,325, must be received as an exaggerated statement—that is, as including all varieties of the *genus* "drug vendor" in the broadest sense of the term, with their assistants and apprentices.—Ed.]

ADULTERATION OF DRUGS.

TO THE EDITOR OF THE DAILY NEWS.

Sir,—Having noticed in your Journal of this day an account of the report of the Committee on the Adulteration of Food, &c., I beg leave to draw your attention to the manner in which the Government of Prussia controls the Druggists as to the price and quality of the drugs they sell. In the first place. a tariff is fixed by the Government. Each Druggist is bound to charge for his drugs according to this tariff, and to note on the back of each prescription which he may make up the separate price of the articles which are named therein; the prices of bottles, white and green, jars, pots, and bill-boxes, are also fixed. Secondly, the district Physician, assisted by Chemists, makes an annual visitation, and examines and analyses the drugs sold by each Chemist. Adulteration is severely punished, and a repetition of the offence is visited by the withdrawal of the concession to act as Chemist. Surely some such check is necessary here, and the efficacy of a powerful medicine, skilfully calculated, should not be rendered nugatory by the fraud of a dishonest tradesman. In illness we all know how much depends upon the success of the working of medicines prescribed for us; if the drugs prescribed are only represented by a fractional part of the article required, the calculation of the Physician is made on an erroneous basis, and the life or health of the patient jeopardised.

Perhaps these few remarks may not be thrown away, and may help to guide any committee in recommending a means of checking this serious evil. I am, &c.,

A Dyspeptic,

who has swallowed Half the Contents of a Druggist's Shop.

Dalston, Sept. 6, 1855.

[No regulations could secure health to a man who has gulped down so much physic. To one who swallows drugs so indiscriminately, it must be a matter of perfect indifference whether they are genuine or adulterated.]—*Daily News.*

CASE OF SUSPECTED POISONING BY A QUACK.

We have received the *Durham Chronicle* of Sept. 14, containing a report of an investigation before Thomas Christopher Maynard, Esq., the district coroner, and a jury, into the cause of the death of John Lawton. Mr. Watson, solicitor, of Durham, attended to watch the case on behalf of Mr. T. Watson, *alias* Thompson, the herbalist, who attended the deceased.

It appears from the evidence that the deceased was attended by Watson, who supplied a mixture and a box of pills, shortly after taking a portion of which the patient died. A part of the mixture which remained was taken away for examination, but the analysis not being perfected the inquest was adjourned.

We subjoin a portion of the evidence of *George Thompson Watson*, herbalist.

The Coroner: What are you?—A herbalist, Sir.

How long have you followed it?—I don't know, Sir. Altogether, nine or ten years, perhaps.

Did you ever serve your time as a medical man?—No, Sir, I didn't serve my time out.

Have you any diploma?—No, Sir, I have not.

How long did you serve?—Between two and three years with Mr. Campbell, of Wooler, in Northumberland. He was a doctor—a general medical practitioner. I cannot just say how long it is since I left him, but I think it is nearly twelve years since. I didn't leave him till he

died, and that is about twelve years since. I have not been with any medical man since. I was not bound to him as an apprentice. I did nothing myself when I was with him but what he told me.

Was he a herbalist doctor?—Yes, Sir, he used both herbs and minerals.

Was he a herbalist?—Yes, he had a proper good understanding of it.

You say he was a regular qualified general practitioner?—Yes, Sir, according to my belief.

How does it happen you were not bound to him?—Well, Sir, I never had any desire to be bound to him. He was an ailing man for a good while.

Did you visit patients at all?—No, Sir, except he was with me. He took me with him sometimes, but I never meddled with anything.

What did he take you with him for?—Oh, just to see the patients.

He was teaching you?—Yes, he was doing all he could.

How did you go to visit the patients?—Sometimes by gig, and sometimes on foot.

Did you drive him?—No, Sir, he always drove himself.

Who attended his horse?—I dare say I attended it.

Don't answer in that way. Did you or did you not?—He had no horses belonging to him. He had one a little while. I did attend upon it. He hired most of his horses.

Who made up the medicines?—Himself, Sir.

Did you ever make any up?—No, Sir; I had nothing to do with that. He showed me what to do, but nothing more.

Did he always tell you what they were for?—Yes, Sir, mostly. It was on Monday that I was sent for to see the deceased. Mrs. Lawton came for me. I was not in. She left word at my house that I was to go out, if possible, immediately. I went on the Tuesday night. I saw deceased, John Lawton. I found him in bed.

Did you examine him?—Yes, Sir.

In what state did you find him?—I asked him how he found himself. He said he felt a pain in his chest. I asked him if he felt pain anywhere else. He said yes, between his shoulders he felt a pain.

What did you find else upon examining him?—I found, at least I thought to myself, there was disease upon the liver.

Which of the symptoms you observed led you to suppose there was disease of the liver?—The pain between the shoulders and his colour. He had a yellow, bad colour. I didn't feel his pulse. His wife asked me after that if I thought I could do anything for him. I said, well I don't know, but I would do all that lay in my power, and told her to come for some medicine. She came on the Tuesday night. I gave her some medicine, a three-gill bottle and a box of pills. I told her if she found he got better, if he lived till that time, she was to give him two pills every other night. There were no directions on the box. I put a direction on the mixture. It was "to be taken two tablespoonfuls three times a day."

What were the pills composed of?—I can't say for that. They are what are called "antibilious pills." I got them at Scawin and Wortley's.

Then, if you don't know what they are composed of, how do you know how they are to be given?—I have asked them all the particulars about that various times.

Don't you know there are some hundred different kinds of antibilious pills?—Yes, Sir, I am aware of that. When I asked them they said they would do him no hurt.

Well, at all events, you don't know what they are, nor what they contain?—No, Sir, he wouldn't tell me.

What were the contents of the mixture?—There was pennyroyal about four ounces.

Did you weigh it?—No, Sir, I have weighed it, but in general I don't do it now.

Do you do it by mere guess?—Yes, Sir.

How was it made?—It was boiled down to a gallon—I might put two gallons in.

Well, but you *might* put three gallons or twenty gallons in. We must have the exact quantity.—I couldn't put above two gallons into it.

Into what?—Into a pan.

You put two gallons of water into a pan and boiled it?—Yes.

What were the contents?—Four ounces of pennyroyal, leaves and stalks; four oz. of the leaves and stalks of common garden thyme.

Can you give me its botanical name?—It is, even in the book I have, called the common garden thyme. There might be about three or four ounces of the barberry leaf, two ounces of common garden balm, two or three ounces of centuary, and there might be about two or three ounces of the leaves and stalks of horehound. There was nothing more than that in it. There might be about two gallons of water boiled down to about a gallon and a half.

To be given as you directed it?—Yes, Sir.

Will you swear that the three-gill bottle which you gave to Mrs. Lawton contained no other ingredient than those which you have stated as forming this mixture?—Yes, Sir, when I gave it out of my hand I can.

Which of these ingredients were likely to have a beneficial effect in case of disease of liver?—I would say myself that both thyme and pennyroyal would carry away all phlegm and nastiness. The balm is of a more binding nature.

What do you give it for?—For the gall, Sir. Simply gave it on account of the deceased being such a bad colour. The other bitter herbs are to sharpen the appetite.

How were you engaged by Mr. Campbell?—I was not engaged by him at all. He just asked me to go, and he would show me everything. It was his desire for me to go with him.

What were you doing all the time you were there?—Just showing me the mixtures, and letting me know the herbs?

Weren't you engaged to take out the medicine for him?—Many a time I did take it out.

Did he give you any wages?—No, Sir.

How did you live, then?—He kept me.

Do you mean to say you did nothing for him?—Nothing, only going an errand, and such as that.

Did you clean his boots?—No, Sir, I didn't.

Who did?—The girl, I expect.

When he had a horse you attended to it, you said?—It was a very short time.

Were you ever brought up to any business or trade?—No, Sir, none.

You never worked at any trade?—Oh yes, I have worked at gardens, and everything that any man has done in a labouring way.

What were you brought up as?—Why, just as a labourer, to do anything.

What was your father's name?—John Thompson.

How does it happen your name is Watson if your father's is Thompson?—Because I am called after an uncle of mine. I suppose it was their desire.

Have you always gone by the name of George Thompson Watson?—Some have called me Thompson: some Watson.

Have you always called yourself by that name?—I could not say for that. Sometimes I have signed Thompson, and sometimes Watson, just as people knew me.

What was the nature of the preparation of barberry leaves?—Something the same nature as balm, but of a more binding nature.

Were ingredients of a binding nature calculated to be beneficial in disease of the liver?—Yes, Sir.

Have you ever been at any medical school?—No, Sir.

REVIEW.

THE ESSENTIALS OF MATERIA MEDICA, THERAPEUTICS, AND THE PHARMACOPŒIAS. *For the Use of Students and Practitioners.* By A. B. GARROD, M.D., Professor of Materia Medica, &c., in University College.

THE author of this little volume, as he states in the preface, "has for some years devoted time and attention to a special study of the therapeutic action of drugs, and had hoped ere this to place the results of his labour before the Profession. In the progress of his task, however, he discovered that every new fact obtained suggested a new subject for investigation and research, while the experience gained by clinical observation did not tend to diminish the difficulties which seemed to him to surround so exhaustless an inquiry." Having been thus prevented, hitherto, from publishing the results of his experience on the subject (Therapeutics) to which he has principally devoted his attention; and feeling the want of some short statement of such natural historical details as he considered essential for the medical student, the present work was prepared with the view of meeting that want. It may be thought if the essentials of Materia Medica, Therapeutics, and the Pharmacopœias, can be comprised in 268 pages of the size of a page of Fownes's *Manual*, that such a work as Pereira's must contain much matter that is either irrelevant or at least unnecessary. The fact is, however, that while Pereira's work, which is justly entitled an *Encyclopedia of Materia Medica and Therapeutics*, supplies the wants of all classes of students, Dr. Garrod's professes only to provide for one class. Since the commerce of drugs has fallen principally into the hands of Chemists and Druggists, and especially since the better informed of these, under the denomination of Pharmaceutical Chemists, have made the natural history of drugs an essential branch of their education, it has become less important than it previously was for the Medical Student to spend much time in the study of this subject. Hence it has become the practice, at University College and other medical schools, for the Professor of Materia Medica to make Therapeutics a more leading and important branch of study than the natural history of drugs. Without this explanation it might be considered that Dr. Garrod's book was rather meagre in natural historical information. It must not be supposed that in this respect it contains the essentials of Materia Medica for the Pharmaceutical Student. Nevertheless, it would not be unsuitable as a first book for beginners.

BOOKS RECEIVED.

The Microscope, and its Application to Vegetable Anatomy and Physiology. By Dr. Hermann Schacht. Edited by Frederick Currey, M.A. Second Edition. considerably enlarged, with numerous Illustrations. London : Samuel Highley, Fleet Street. 1855. (From the Publisher.)

On the Function of Salt in Agriculture. By A. Beauchamp Northcote, Esq., Senior Assistant in the Royal College of Chemistry. (From the Author.)

On a New Process of obtaining and purifying Glycerine. By G. Fergusson Wilson, Esq., F.R.S. Read at the Glasgow Meeting of the British Association for the Advancement of Science, September, 1855.

TO CORRESPONDENTS.

Inquirer (Canterbury).—*Stephens' Blue Ink.* Vol. xii., p. 70.

J. C. (Walworth).—There would be no advantage in dissolving the gallic acid in hot water, but rather the reverse, as the acid would recrystallize on cooling. We therefore think the water should be used cold.

A Life Member (Mile End Road).—(1.) If a portion of compound extract of colocynth *in powder* be used, so as to reduce the mass to a proper consistence, the pills will not become flat.—(2.) *Patent Medicine Licence:*—A person having two establishments is not required to have more than one licence, provided both addresses be on the licence.—(3.) Yes.—(4.) Sale of Spirit of Wine, vol. iv., pages 480, 493, and 577 ; vol. vi., pages 99, 101, and 145. It is a wise precaution to have a written order, stating that it is "for medicinal use."—(5.) *Cosmetique* is a term applied to a compound made by melting lard with about half its weight of wax, and colouring according to fancy. It is sold in sticks.

H. J. (Sunderland).—(1.) No.—(2.) Yes.

I. A. (Peterborough).—(1). We cannot account for the difficulty referred to in making the quinine wine.—(2). *Pure Protosulphate of Iron:*—Dissolve the sulphate of iron of commerce in its own weight of boiling water, acidulated with sulphuric acid ; filter, and set aside the solution to crystallize.

I. R. (Warrington).—The Pharmacopœia alluded to is used at the London Hospital only.

A. D. S. (Hampstead) should apply by letter to the Secretary, 17, Bloomsbury Square, who will give the information required.

E. H. (Torrington).—Hair Dye. See page 144 of our last number.

T. W. (Alnwick).—(1.) Not in our province. (2.) *Dental Surgery*, by Tomes, price 12*s.*

An Assistant (Exeter).—*Incense*, vol. ix, pages 344 and 444.

T. F. C. T. (Fife).—*Elæosaccharum Anisi.* The Paris Codex directs—essential oil of aniseed one drop, refined sugar ʒj., triturate in a mortar. Two drops of the oil to ʒi. of sugar is often used in this country.

I. G. (Liverpool).—Vol. vii., No. vii., of this Journal.

Iodineum.—Iodide of ammonium may be prepared by adding carbonate of ammonia to iodide of iron in solution, or by neutralizing caustic ammonia with solution of hydriodic acid.

Ignoramus.—Gingerine is best prepared by carefully distilling off the spirit from essence of ginger.

Juvenis (Manchester).—(1.) *Tannate of zinc* may be made by adding tannate of potash to sulphate of zinc in solution.—(2.) Add dilute sulphuric acid, when the sulphurous acid will be set free, which may be detected by the small and other properties.

We have received from Dr. Polli, of Milan, for the Pharmaceutical Society, some specimens of chemical and Pharmaceutical products, of which the following is a list :

Citrate of Quinine; Citrate of Quinine and Iron; Iodide of Quinine; Bisulphate of Quinine; Valerianate of Quinine; Arseniate of Quinine; Trisulphate? of Quinine; Sulphate of Morphia (two specimens); Ferro-tartrate of Potash; Mannite.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XV.—No. V.—NOVEMBER 1st, 1855.

THE LIST OF MEMBERS AND ASSOCIATES OF THE PHARMACEUTICAL SOCIETY.

The successive exertions on behalf of the Pharmaceutical Society, in obtaining, first, a charter—secondly, an Act of Parliament—and, lastly, the ratification of the same by the learned judges, may be compared to a protracted campaign, at the close of which it is proper in calling over the "muster roll" to take an account of the "dead and wounded."

The Council having directed a complete list of the Members and Associates to be prepared for publication in January, it became necessary to communicate with those whose non-compliance with the terms of the Charter had occasioned the omission of their names from the register, but who were eligible for re-admission under the Bye-laws. A circular was, therefore, prepared, directing attention to the absence of the names on the register, and reciting in substance the 12th and 16th sections of the Pharmacy Act and the Bye-laws relating to the retirement and re-admission of Members. Rather more than 600 copies of the circular were issued, which elicited the following information:—Deceased 60, retired 102, emigrated 61, removed 115, failed 20, absconded 3, desirous of re-admission 44 (of whom 26 have been re-elected), resigned and returned the certificate of membership 17, refuse to comply with the laws 6, not known in the neighbourhood 5, gone into other businesses 42, as follows: 1 photographist, 2 homœopathic chemists, 1 cabman, 2 stockbrokers, 2 clergymen, 4 farmers, 5 dentists, 1 printer, 9 surgeons, 1 physician, 1 wine merchant, 1 brewer, 1 clerk, 7 assistants, 1 quack tooth-drawer, 2 apothecaries, 1 barber. In a considerable number of cases no answers have been received; but the facts before us are sufficient to show the vicissitudes to which the members of our business are liable, and the rapidity with which a generation passes away—the above changes having occurred within ten years. It will be seen that about two-thirds of the number of those to whom the circular was sent, are removed from the list from extraneous causes, such as death, emigration, retirement from the business, &c. Of the remaining third, a large proportion of those who have replied are likely to renew their Membership; and some answers have been received since the above statement was prepared.

The list which is in course of preparation will contain the names of all the Members, Associates, and Apprentices, on the several registers for the present year. There are still a few members whose subscriptions are in arrear, and who, if they desire to be included in the list, must comply with the laws of the Society before the 1st of December. The list of Members will be arranged in four columns:—

Year of Admission.	Number of Certificate.	Name.	Address.

The second column relates to the certificates of the Board of Examiners, which are numbered consecutively from the commencement of the examinations up to the present time. It will, therefore, be seen at a glance on reference to the list which Members or Associates have passed the examinations, and at what date, also the number of years that every individual on the list has been connected with the Society. The list is ordered by the Council to be completed and issued with the January number of this Journal.

THE TRANSMISSION OF PERIODICALS THROUGH THE POST.

The recent regulations of the Post Office have given great facilities for the circulation of periodicals. The privilege was previously restricted to publications consisting of only one sheet, not exceeding a certain size, the folding of which, especially in a work not larger than octavo, was rather inconvenient. Under such circumstances the addition of a supplemental page or two, or an extra leaf of advertisements, was scarcely practicable; or if so, it was at the expense of double postage. At almost every Annual Meeting of the Pharmaceutical Society the irregularity in the delivery of this Journal to Members and Associates was a source of complaint, and various suggestions were made for bringing the work within the dimensions and conditions of a periodical transmissible by post. This, however, was found to be incompatible with the form and variable dimensions of the Journal, and the only arrangement which could be adopted consisted in sending a parcel to each town, either by rail or by favour of the booksellers or the wholesale druggists. This entailed the necessity of going to press three days at least before the end of each month, and when the first of the month occurred on a Tuesday, it was necessary to print on the previous Thursday, to ensure the punctual delivery in time for the booksellers' parcels on the Saturday. This was particularly inconvenient when any proceedings were taking place of which it was desirable to give the Members the latest possible intelligence; and it was sometimes a source of regret and annoyance, that while the daily papers conveyed to each reader at his breakfast-table a report of events of the previous night, or speeches delivered as late as two or three in the morning, the readers of the *Pharmaceutical Journal* could not receive the official report of an occurrence taking place during the last four or five days of the month in the Journal published on the first proximo, and professedly containing the latest news.

The now existing regulations of the Post Office greatly diminish this inconvenience, by enabling us to go to press about two days later than was previously necessary, and, at the same time, affording a means of transmission to each Member and Associate in time for delivery on the first of the month to those residing within a moderate distance of London, and to remote parts of the kingdom not later than the second.

To ensure the regularity of this delivery, it is necessary that the Secretary of the Society shall be informed correctly as to the precise address of each individual, which information he does not possess in the case of all the Associates and Apprentices, many of whom have changed their residences since the entry of their names on the register of the Society. Such changes were not of necessity reported to the Secretary in London, while the distribution of the Journals was effected by the local Secretaries.

To enable the Secretary to take advantage of the new postal regulations, the following notice was inserted on the official page of the cover of the *Journal* for September :—

"Notice.—In order to insure the regular and punctual delivery of the Journal to each Member, Associate, and Apprentice through the medium of the post, it is necessary that immediate Notice of every Change of Residence be transmitted to the Secretary of the Society, 17, Bloomsbury Square, London.

"Every Associate and Apprentice is particularly requested to forward to the Secretary, *on or before the first of October next*, the name and address of the person with whom he resides, and to furnish the same specific information upon every change of residence.

"In default of explicit information being received according to the above instructions, the Society cannot be responsible for the loss or non-delivery of any Journal."

The number of Associates and Apprentices to whom the above request was addressed on the official page of the cover is upwards of 600. The number who complied with the request within the period stated (viz., a month) was only twenty. We are therefore under the necessity of alluding to the subject in this part of the Journal.

THE PEREIRA MEDAL.

The Pereira Memorial Committee, at a meeting held on the 28th of October, 1853, adopted the estimate of Mr. Wyon for the die of a medal at a cost of £84, and authorized the execution of the work. The Committee, by a resolution passed at the same time, decided "that the Pereira Medals be awarded by the Council of the Pharmaceutical Society under such regulations as they may from time to time consider expedient." This resolution was accompanied by the following recommendation:—"The Committee recommend that the competition for the Silver Pereira Medal be confined to Students and Associates of the Pharmaceutical Society; that the Gold Medal be awarded for important original investigations or discoveries in Materia Medica; and that it be open to universal competition."

On receipt of an intimation from Mr. Wyon that the die was completed, a meeting of the Pereira Memorial Committee was summoned by advertisement *pro formâ*, to receive an impression and order a settlement of the account. This meeting took place on the 12th of July, 1855, and the medal gave general satisfaction. Mr. Wyon has been very successful in the likeness of our late Professor, which is considered by some of his nearest relatives and most intimate friends to be in every respect satisfactory. The obverse of the medal contains the words "Awarded by the Pharmaceutical Society of Great Britain" within a wreath of medicinal plants, arranged and beautifully executed by Mr. Wyon chiefly from nature, with the assistance of a standard work on medical botany, in which the characters of the plants are described and figured.

The precise regulations under which the Pereira Medal is to be awarded are not yet fully decided; but it was generally understood, from the commencement, that a silver medal would be awarded annually as the first prize in Materia Medica, when the merit of any candidate should be considered such as to entitle him to the distinction.

The competition for prizes was, on the last occasion, more limited than usual in regard to Members; and we take this opportunity of adverting in general terms to the circumstances which appear (however erroneously) to influence the decision of Students on the question, Whether they shall become candidates? If there be a Student, or two or three Students, whose diligence and regularity in attendance may have placed them in a favourable and prominent position as "prize men," other Students are sometimes discouraged, and think it "not worth their while" to compete with apparently so small a prospect of success. Again, if one of the Students happen to be a few years in advance of the majority, having attended the school during previous seasons, and being therefore considered a "biennial" or "perennial,"—the "annuals" say it is not fair for him to be allowed to compete; and upon his name being announced as a candidate some of them hide their diminished heads and retire. A feeling of diffidence will sometimes deter a young man from competition when his abilities and general industry might have placed him in a good position. In other cases an idea prevails that it is a disgrace to be defeated, but no disgrace to abstain from the trial, and that the chance of success is not worth the risk. Such are the under-currents which narrow the field of action, reducing the number of candidates to four or five, or even less, the remainder of the class not participating in the benefit of the competition.

This leads us to the inquiry, What is the real object of prizes, and for whose benefit are they offered? Is it the aim and intention of these competitions to elevate one or two of the class to a distinguished position, to the disparagement of the remaining forty or fifty? We consider this view of the question to be a serious error, and one which greatly diminishes the advantage contemplated on such occasions.

The principal advantage to which we refer is the stimulus to industry. In this all have an equal right and opportunity to participate. The successful candidate gains the prize, which is but the shadow of the real benefit. Its value consists in the fact that it represents the amount of proficiency which he has attained by his industry, stimulated by emulation, and directed in the proper channel. Success is at all times satisfactory; but if the prize-man be elated and self-satisfied, if he should consider that he has attained the object of his ambition, and has no further need of industry and perseverance, his prize would be a misfortune instead of a benefit. Those whom he has left far behind in the contest may yet outstrip him in their professional career; they may persevere and obtain the substance, while he is content to enjoy the shadow. It is no disgrace to be defeated at a competition for prizes, even when the relative advantages and position of the candidates are nearly alike. If the candidates be many, the selection of one as the best does not imply a deficiency in the capacity or in the merit of others. It is sometimes extremely difficult to make the award, and justice demands that a general encomium should be pronounced on the class. Again, if it be supposed before the contest that one candidate is almost "certain to win," this is no reason for others to retire. To be beaten by one possessing superior advantages would be no dishonour, but a victory under such circumstances would be meritorious in proportion to its difficulty. In any case, each candidate, while striving for a prize, is deriving more substantial advantage than the prize itself, by yielding to the impulse of emulation, and thus acquiring knowledge which may pave the way to professional success.

While making these remarks in reference to prizes generally, we wish to invite the attention of the Students and Associates of the Society to the Pereira Medal, which should serve as an additional inducement to diligence in study. Those who intend to compete for this distinction should lose no time in making the needful preparation; and each should recollect that, whether he receive the prize or not, he will have no reason to regret the labour which he will have bestowed in the endeavour to obtain it, as the labour will bring its own reward.

The Pereira Medal affords two sources of emulation: first, The distinction for general proficiency in Materia Medica to be acquired at the Annual Examination at the close of the lecture session of the Pharmaceutical Society. This competition for the silver medal will be open to all Associates and Students of the Society. Secondly, The gold medal will be awarded for important researches or discoveries, and the competition will be open to the public at large, whether in this country or abroad. There are many subjects on which further information is required, in relation to the sources, history, mode of production, and preparation of substances comprised in the Materia Medica. The revision of the Pharmacopœia, and the amalgamation of the three Pharmacopœias of London, Edinburgh, and Dublin into one, will furnish various subjects for investigation; and the Pharmaceutical Society having undertaken a share of this work, the labour and talents of its Members may be beneficially employed in such researches.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

MAJOR EXAMINATIONS.

October 16th, 1855.

Atkins, Ernest.....Woolwich
Atkinson, Mathew .....Manchester
Fouracre, Robert.....Salisbury
Preston, Richard.....London
Willett, Edmund.....Kennington Park

MINOR EXAMINATION.

Harden, Charles.....Bristol

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	TOWNS.
Coulthard, Christopher	Mr. Harrison	Carlisle
Davis, Richard	Mr. Smith	Walworth
Dawson, John	Mr. Goddard	Yarmouth
Dean, Samuel	Mr. Fox	Bethnal Green
Grigor, William	Mr. Macfarlane	Edinburgh
Keene, John	Mr. Savage	Brighton
McCabe, Dunbar	Mr. Macfarlane	Edinburgh
Malin, Edmund C. M.	Mr. Huggins	Barnet
May, Augustus S.	Mr. Greenwell	London
Pitman, John	Mr. Fendick	Bristol
Potts, Robert A.	Mr. Potts	London
Rae, John I.	Mr. Mackay	Edinburgh
Richardson, John G. F.	Mr. Gerrard	Longton
Rowell, Charles F.	Mr. Hope	Uppingham
Videon, Charles	Mr. Whitmore	London
Wood, Robert	Mr. Stephenson	Whitby

PHARMACEUTICAL MEETING,

Wednesday, October 3rd, 1855,

MR. J. T. DAVENPORT, PRESIDENT, IN THE CHAIR.

The Chairman, in opening the meeting, said that that being the commencement of a new session, the prizes awarded to the successful competitors in the Lecture Classes at the conclusion of the last session, would, according to their usual custom, have been distributed, but some delay having occurred in preparing the medal, the distribution was necessarily deferred until the next meeting.

The following donations were announced:—

The Journal of the Society of Arts, from the Society of Arts.
The Journal of the Photographic Society, from the Photographic Society.
The Literary Gazette, from the Publishers.
The Chemist, from the Publishers.
The Norwegian Pharmacopœia, from the Editors.

Several chemical specimens, including citrate of quinine, citrate of quinine and iron, iodide of quinine, bisulphate of quinine, valerianate of quinine, arseniate of quinine, lactate of morphia and mannite, from Dr. Polli, of Milan.

Impermeable lambskin air-cushion from Dr. Alison. This was accompanied by a note, in which Dr. Alison says:—"The cushion is very soft and light, and in my own opinion, and that of many eminent surgeons, is calculated to be very useful in medicine," &c.

Specimen of "Ball salve," from Mr. T. S. Webb, of Bilston. This specimen was

accompanied by a note, in which Mr. Webb states :—"It is collected by the miners, and found in the centre of the lumps of ball ironstone. Our ironstone is all argillaceous, and a great deal of the clay in which the strata of ironstone are imbedded, has a black and greasy appearance, emitting a smoke when burnt, smelling something like the snuff of a candle. I have kept some of this for several years, and it does not alter in smell or appearance. It does not dry up on the surface; no part of it appears to evaporate. The colliers apply it to burns and sores, and say it is useful."

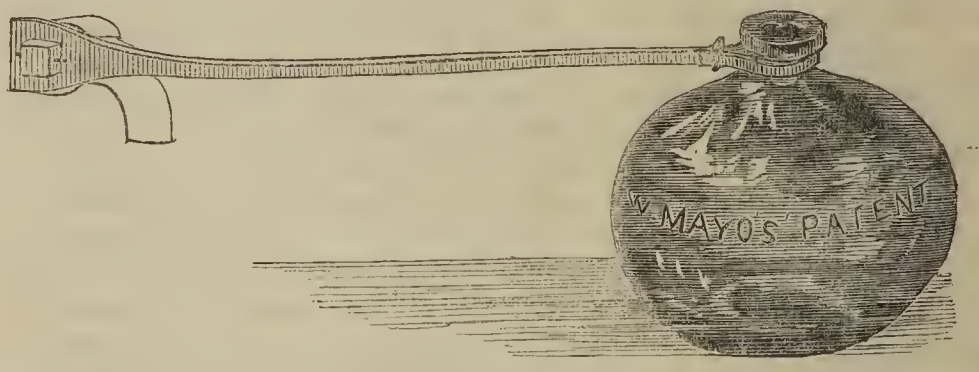
Specimens of Australian manna, from species of Eucalypti, from Mr. Golding, of Upper Albany Street.

Rhizomes of Alpinia nutans and Radix Victorialis, from Mr. Daniel Hanbury.

Mr. Hanbury said he obtained the specimen of Alpinia nutans through a Member of the Society, Mr. Stutchbury of Demerara. As it had been stated by Dr. Pereira, on the authority of Roxburgh, that it is imported into England under the name of Galangal, he had compared the two substances, and found them quite distinct and different.

Mr. Smith, the Secretary, said the meeting would be sorry to hear that Mr. Stutchbury, the contributor of the specimen to which allusion had been made by Mr. Hanbury, and who had presented many other valuable specimens to the Museum of the Society, had recently died on his voyage to England.

Mr. Bell directed the attention of the meeting to Mayo's patent glass float, which was intended to replace those usually made of copper. This apparatus is represented by the accompanying cut.



The following are its advantages, pointed out by the Patentee :—It effectually resists the extreme changes of temperature, cannot impart any noxious impregnation to water, or any other liquid, nor can acid injure it ; is much cheaper and more cleanly than copper, zinc, or any other metal, and, in case of damage, can readily be replaced at a small cost, whilst it affords greater protection to, water companies, as well as householders, being valueless for any other purpose.

Specimens may be seen at the office of the agents, S. and E. Ransome and Co., 31, Essex Street, Strand.

ALLEGED ADULTERATION OF ANNATTO.

Mr. Redwood, in the absence of any formal paper for the evening, made some remarks on the subject of annatto, and the statements which had recently been published with reference to its use and alleged adulterations. His object in bringing the subject forward on this occasion was principally to elicit information. He had been requested by some parties engaged in the commerce of this article to make a thorough investigation of the questions relating to its production, preparation, and use, with the view of correcting what these parties conceived to be very erroneous representations which have been made to the public. He was enabled, by means partly of specimens from the Museum of the Society, and partly of specimens obtained from other sources, to illustrate the different varieties of annatto as met with in commerce, and to point out their different properties.

Annatto, he stated, is a colouring matter derived from the seed of a plant, the *Bixa orellana*, which is a native of the West India islands, South America,

and the East Indies. It is in South America, however, that the colouring matter is principally manufactured. There are two kinds of annatto imported into this country, namely:

1. *Spanish annatto*, which is made in Brazil, and comes chiefly from Para, in baskets each containing thirty or forty pounds weight; and,

2. *Flag or French annatto*, which is made in French Guiana, and especially on the island of Cayenne, from whence it is exported in casks, each containing several hundred pounds.

These two varieties of annatto differ considerably from each other in some of their characters and properties. Flag annatto has a very disagreeable, somewhat putrescent smell, from which Spanish annatto is entirely free, the smell of the latter, when fresh and good, being rather agreeable than otherwise. But while Spanish annatto has a decided advantage over flag annatto in regard to this character, it is nevertheless inferior to flag annatto as a dyeing or colouring agent.

There are two processes described as those adopted in the manufacture of annatto. The seeds from which the annatto is obtained are red on the outside, but perfectly white within. One of the processes consists in rubbing and washing off the colouring matter from the surfaces of the seeds with water, then allowing the colouring matter to subside, and exposing it to spontaneous evaporation, until it acquires a pasty consistence. The other process consists in bruising the seeds, which contain albuminous and farinaceous matter, as well as the colouring principle, mixing them with water, and then leaving the mixture to ferment, during which operation the colouring matter collects at the bottom of the vessel from which it is subsequently removed, and brought to the proper consistence by spontaneous evaporation. It is probable that the disagreeable smell of flag annatto arises from the adoption of the latter process, the fermentation being carried to the putrefactive stage. It is possible, also, that the superiority of the colouring matter in flag annatto may be due to the influence of fermentation.

In applying either of these processes in the countries in which annatto is made, the products are liable to great variation in quality, no two samples being precisely alike. The inspissation of the pasty mass is said to be effected by exposing it to the air in shady places; but if too long exposed to the air the colour is injured by the action of light, and if not sufficiently inspissated, it undergoes injury from the action of the retained water. It is obvious, too, that in carrying out such a manufacture in the rude way in which it is likely to be conducted in those countries, there would be constantly varying proportions or the true colouring matter, and of starch, woody fibre, and other worthless constituents or impurity, contained in the annatto. Much of the annatto as imported into this country is in such an imperfectly inspissated state, that it cannot be kept for many months without undergoing decomposition, often becoming filled with maggots, and rendered wholly unfit for use.

There are several different applications which are made of annatto. It is used, and this is probably its most extensive application, for dyeing silk and wool. It is said to be inapplicable for dyeing cotton. It is used by the Russians for staining the Russian leather. It is employed as a colouring agent in some kinds of varnish. It is also used for imparting colour to cheese, butter, and some other articles of human food. For some of these applications the annatto requires to be specially prepared, as it is unfit for use in the state in which it is imported from abroad. Thus, for instance, the annatto which is used for colouring cheese is generally prepared for that particular purpose. In the state in which it is imported it does not yield its colour to water, but the colouring matter must be rendered soluble in water in order to be applicable for the colouring of cheese. If it be used for colouring varnishes, this preparation is not required or even available; but it has to be prepared in a different way. Hence, annatto is one of those imported articles which, before it goes into the

hands of the retail dealers, is subjected to certain processes by which it is fitted for the particular uses to which it is to be applied. One of the objects of thus preparing annatto for commerce is to render it less liable to undergo decomposition than it would be in the state in which it is imported. In preparing annatto with these objects, certain additions are made to it. Substances are added, some of which are intended to prevent decomposition, and others to develop the colour required and make this soluble in the menstrua by which it is to be applied. Annatto prepared for colouring cheese has an alkali added to it, and it is either made into the form of a clear liquid of a dark yellowish-brown colour, or of a stiff paste, unalterable by keeping, and the colour of which is readily soluble in water.

Mr. Redwood proceeded to state that the preparation of annatto for colouring cheese in this country was in the hands of some three or four manufacturers, who were respectable merchants, and whose names were well known in those agricultural districts in which cheese is coloured with annatto. These manufacturers had complained of statements which have been published with reference to the alleged adulteration of annatto. It was stated by Dr. Hassall, in his evidence before the Committee of the House of Commons, that he found annatto to be adulterated with chalk, flour, turmeric, salt, an oily substance (probably soap), a red ferruginous earth (probably Venetian red), copper, and lastly red lead. Dr. Normandy, in his evidence before the same Committee, also states that he found ochre and red lead in annatto. The publication of this evidence was followed by a letter in *The Times*, in which train oil and soft soap were included among the substances of which the greatest bulk of the cheese-colouring used in this country is composed. These statements, if true, were calculated justly to alarm the public, and to create a prejudice against the use of cheese coloured with annatto, and if the statements conveyed (as he Mr. R. was informed was the case) an incorrect representation of the facts of the case, they were calculated unjustly to inflict an injury upon those who derived their means of support from the manufacture and commerce of this article. These parties denied that there was any truth in the statements which had been published. They did not deny that annatto, prepared for colouring cheese, contained ingredients which were not present in the annatto as imported—cheese-annatto being avowedly a prepared or compounded article—but they denied that there was anything injurious to health introduced into this kind of annatto, and they objected to the application of the term adulteration to that sort of preparation or admixture which, whilst it was openly admitted, rendered the substance much better suited and more valuable, than it would otherwise be, for the purpose for which it was intended.

He, Mr. R., having been appealed to on the subject, was anxious to obtain information from Members of the Society throughout the country with reference to the alleged adulteration of annatto. If red lead, or any poisonous or disgusting substance was introduced into the annatto intended for colouring food, it was right that such practice should be exposed and put a stop to; and as annatto was sold by most country Druggists, they would be likely to know if any ill effects had resulted from the use of such adulterated article. He should be glad to receive information from such as could aid him in this inquiry. As far as his own experience went, it gave no support to the statements referred to, but he was not prepared to express an opinion upon the general question one way or the other. He attached but little importance to what was published by those authors who treated of adulterations. On referring to the works of Dr. Normandy and others, he found statements with reference to adulterations, some of which related to times long past, and others to foreign countries, but not to this country. Book-makers take much of their information from journals, and they copy from each other, so that an isolated fact that may have occurred a century ago, is sometimes handed down from generation to generation as if it were of frequent occurrence. Then, with reference to Dr. Hassall's book, the

authority it carried had been greatly diminished by the disclosure of the extraordinary fact that the "Analytical Sanitary Commission," from the reports of which it originated, consisted of only one individual, whose qualification for the duty he had undertaken did not appear to comprise a knowledge of chemical analysis. Under these circumstances it was not to be wondered at that little confidence was felt in many of the statements which had been published, and that further investigation of the subjects referred to was desired.

At the conclusion of Mr. Redwood's communication some discussion took place, in which Messrs. Hooper, Bell, Giles, Hanbury, Davenport, Bentley, and Copner took part, and in the course of which it was stated, that while it is desirable to correct any erroneous representations made before the Committee of the House of Commons, it is necessary to be careful not to appear advocates or apologists in any degree for the adulteration of food or medicines.

PHYTOLOGICAL CLUB.

The next Meeting will be held on Wednesday, November 14, at half-past eight P.M.

The Committee beg to inform the Members of the Club that they have numerous duplicate botanical specimens, which are ready for distribution.

Application to be made to Mr. C. Wood, 17, Bloomsbury Square.

The following Notice has been circulated by the

NORTH BRITISH BRANCH OF THE PHARMACEUTICAL SOCIETY.

SESSION IV.—MEETING I.

The Session for 1855-56 of the above Society will be opened in Edinburgh on the evening of Tuesday, 30th October, at nine o'clock precisely, in the Rooms, 72, Princes Street,

JAMES GARDNER, ESQ., PRESIDENT, IN THE CHAIR.

After the opening remarks by the President, the following communications will be made:—

1. An Introductory Address by Dr. Douglas Maclagan, F.R.S.E., Honorary Member of the Pharmaceutical Society, &c.
2. On the Manufacture of Sulphuric Acid, with special reference to recent Improvements in the Process, by Dr. Stevenson Macadam, F.R.S.E.

The Library Committee have arranged to re-commence giving out books and periodicals every Thursday night, from half-past nine to ten o'clock. Some additions having been made to the list, the Council hope advantage will be taken of the opportunity now offered in this department throughout the present session. The rules regulating the use of the books, and all matters connected with the Library, can be seen at any time in the Museum Room.

The Council beg to draw the attention of Members, Associates, and Apprentices to the announcement of Dr. Macadam's lectures, herewith appended, and to express the hope that the arrangements made by Dr. M., with an especial reference to suit the convenience of those who are so much occupied during the day, will be appreciated, and a full attendance prove that those connected with the Society recognize the importance of such facility being given for their instruction and improvement in so requisite a branch of their pharmaceutical studies.

The Council are desirous that Monthly Scientific Meetings be regularly held, and respectfully invite the co-operation and assistance of Members and others interested in this matter.

The Museum of the Society here is about to be much improved and enlarged—some additional show-cases having been ordered. Contributions are therefore solicited, and as the large room will in future be the receptacle of specimens, and as greater space and convenience will thus be given for their exhibition, it is to be hoped that the various objects will be greatly increased, both in point of number and value. The Council take this opportunity of thanking those gentlemen who

have hitherto so kindly aided them in their endeavours to extend this important department of the Society.

The Council are requested to attend in the Museum Room on the night of meeting at half-past eight o'clock.

Edinburgh, 19*th October*, 1855. JOHN MACKAY, *Secretary.*

LECTURES ON CHEMISTRY, IN CONNEXION WITH THE PHARMACEUTICAL SOCIETY.

Dr. Stevenson Macadam, F.R.S.E., will commence his course of Fifty Evening Lectures on Chemistry on Monday, 12th November, at a quarter past nine P.M., in the Room of the Pharmaceutical Society, 72, Princes Street.

These Lectures will continue to be delivered on the Monday and Thursday evenings during the six winter months. Fee, £1 5*s.* Gentlemen not connected with Pharmaceutical establishments are admitted to this class at a fee of £1 11*s.* 6*d.*

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

COUNCIL FOR THE YEAR 1855-6.

MR. J. ABRAHAM, President; Mr. H. S. Alpass, Vice-President; Mr. R. Sumner, Treasurer; Mr. N. Mercer, Secretary; Messrs. H. Coupland, E. Evans, H. S. Evans, R. R. Jackson, E. Jardine, W. Rawle, J. B. Edwards, W. Wright. Teacher of Practical Pharmacy, J. B. Edwards, Ph. D. Librarian, Mr. T. D. Walker.

The first meeting of the seventh session of this Society was held in the Royal Institution on Thursday evening, 11th October, the President, Mr. ABRAHAM, in the Chair.

Mr. D. Wharrie and Mr. A. Jones were elected Members of the Association.

The following Donations to the Library and Museum were announced by the Secretary:—Dr. Thomson, his *Introduction to Meteorology*. Mr. T. D. Walker, Davy's *Agricultural Chemistry*. Dr. Dickinson, Lewis's *Dispensatory*, 1799; Duncan's *Dispensatory*, 1830; Thomson's *Conspectus*, 1828; Geoffroy's *Materia Medica*, 1st vol., 1741; Cullen's *Materia Medica*, 1st vol., 1789; Paris's *Pharmacologia*, 2 vols., 1829; Murray's *System of Materia Medica and Pharmacy*, 2 vols., 1822; Venel's *Matière Médicale*, 2 vols., 1787; *Pharmacopée Française*, 1818; *Pharmacopœia Edinburgensis*, 1782 and 1803; Healde's *Translation of the P. L.*, 1788; White's *Analysis of the P. L.*, 1792; *Pharmacopœia of the Liverpool South Dispensary*, 1833; ditto of Dr. Steven's Hospital, Dublin, 1834; *London and Provincial Medical Directory*, 1854; Fuller's *Pharmacopœia Extemporanea*, 1730; Thomson's *Organic Chemistry*, 1838; Wilson's *Chemistry*, 1850. The Pharmaceutical Society, the *Pharmaceutical Journal* for October. Daniel Hanbury, Esq., London, eleven specimens of Tragacanth, illustrative of a paper by S. H. Maltass, Esq., *Pharm. Journal*, fol. 18, vol. xv. J. Evans, Esq., London, twenty-five specimens Cinchona Bark, arranged and vouched for by J. E. Howard, Esq. Messrs. Evans, Sons, and Co., sixty-two specimens Drugs imported into Liverpool, collected by Mr. H. S. Evans. Messrs. J. H. and S. Johnson, twenty-seven specimens Dried American Herbs. Messrs. R. Sumner and Co., one specimen Sulphuret Antimony.

The President then delivered the following Address:—

It is usual in Societies of this kind, although not hitherto in ours, for the President, at the commencement of the Session, to address the Members on the business which calls them together; and I think I cannot better show my respect for the office I hold than by following such examples. Of the several Societies in this town devoted to scientific and literary pursuits there is not one whose province embraces a wider or more important field of inquiry—there is not one of which the special pursuits of its Members afford more ample opportunities for acquiring knowledge on the most interesting subjects. I am wholly unable to do justice to these, and I shall therefore only refer to a few matters of immediate practical importance to us in the pursuits in which we are engaged. The Association has now existed for five years, and some may ask what it has done. I believe it has done as much as any similar Society has accomplished. It has implanted in some minds a respect for science, in others a love of science; to many it has afforded opportunities for the cultivation of science. And we cannot foresee how great may be the fruit produced by the seed it has planted or fostered. I say this not to felicitate our-

selves, but that we may be encouraged to persevere. We have not done nearly so much as we ought to have done. We have not done so much as we could have done with advantage to ourselves and to society. I believe, however, that nearly the same may be said of most Societies professedly devoted to philosophy. They all fall far short of their vocation. If the Members were filled with the zeal which animates a few, they might accomplish far greater things than are performed or are in progress. A great part of our Members are devoted to the practical application of a particular branch of the science of Chemistry. I take the liberty of saying a few words to those of our younger Members who intend to be Pharmaceutical Chemists. The passing of the Pharmacy Bill will make a great change in your position. Conferring, as in future it will do, the title of "Pharmaceutical Chemist" only on men who have proved that they possess some knowledge of the science, it will fix on all who do not use that name a character of inferiority which will justly deprive them of public confidence in their fitness to perform the functions of the present chemist and druggist. And although the title is not yet a test of qualification, the liberal and just conduct of the Pharmaceutical Society has enabled them, I believe, to enrol almost every fit person in the list of their members. If you wish to be one, you must study, and you must diligently avail yourselves of all opportunities for improvement. These opportunities will vary with each of you, but more depends upon yourselves than upon any external circumstances. The diligent will surpass the more fortunately placed. Every acquirement, every new fact stored in the mind, assists in the acquisition of more knowledge. Without diligence no teaching will avail—with it, every difficulty will be overcome. In these days of books you may aspire to any height. And ours is a delightful, an honourable profession. It is for each to determine for himself whether he will occupy an honourable place in it, or remain, like many others, ignorant of the composition of the articles which he has to handle and to compound—as ignorant, comparatively, as the watchmaker who can make wheels, but cannot combine them to make a timepiece. And if any are ambitious of fame, think not that the field of discovery is exhausted. Newtons, and Davys, and Faradays will rise and enlighten the world, and die, and the fields of nature will bear more fruits to the tiller of her soil. Some may exert their energies for the cheaper production of what are already known—others, in the discovery of new applications; and an interesting instance of the successful application of science in both these directions has recently occurred in the case of the metal aluminum. Until recently the notices of this metal have been very meagre. Now it promises to be more useful than silver, as well as far more abundant. And Providence has blessed us with many other good things of which we do not now dream, but which may make immense changes in the world. During the last year considerable and general interest has been excited on the subject of the adulteration of articles of food and medicine. That such adulteration exists I suppose no one questions, though as to the degree in which it prevails there are differences of opinion. How the fraud is to be prevented is a still more difficult question. We ought to be ready to assist the public in this matter, and I believe that the progress of pharmaceutical science is most powerfully aiding in providing the public efficient drugs and wholesome food. Experience clearly shows that an inquisitorial inspection will not obtain these objects. It has been tried in the case of drugs sold in London; for the power rests with certain medical authorities, if they have not lost it by disuse. It has been tried extensively in the case of exciseable articles; but who does not know that spurious brandy, and villanous port, and adulterated malt liquors abound, notwithstanding an army of supervisors and the most severe penalties? And how great is the difference in the qualities of tea and tobacco! But it is not sufficient in the case of medicine that the articles should be genuine: where life is at stake they ought to be of the best quality. I suspect that the law is defective in treating as a civil what ought to be a criminal offence. The use of the microscope, which is more and more extending, will give powerful help in the good work. During this year a movement of much general interest took place, with a view to obtain an earlier closing of our shops. Throughout the kingdom generally it has long been the practice for chemists and druggists to keep open their places of business much longer than other respectable tradesmen. I believe there is no good reason for this custom, and it is almost universally agreed that the ordinary hour of closing has been excessively and perniciously late. In this town, few, before this

year, closed earlier than ten P.M., and I believe a majority kept open until eleven, and some even later. And yet *custom* only was pleaded in individual defence of this practice ; and it was believed by many that a combined movement would terminate it without injury to any one. In this belief a meeting was called. It was numerously attended, and, after a canvass, all the chemists in the town, except two, pledged themselves to each other to close their shops at the not very early hour of nine. This is not many months since, and yet I am sorry to say that already the movement, as a combination, is at an end. Some from whom better things might have been expected soon fell off from it. The most remarkable thing about this was that every one blamed his neighbour. There were not more than three or four cases, I believe, in the town, where the parties considered that they lost anything by the change where their neighbours joined in it: but each, as I said before, alleged his neighbour's example for departing from his agreement. I believe that these complaints were often founded on unreasonable jealousies ; but when one allowed himself to be influenced by them, his defection soon spread, and less unreasonably to others, who, instead of appreciating the benefits of the change, seemed rather to think they were conferring a favour by adopting it. The agitation, however, though productive of less general benefit than was desired, has borne good fruit. Some have not seceded from the hour first fixed upon, and others close at ten who formerly did their utmost to attract every passer-by until eleven, and later. As the status of our profession is raised, as I trust it will be, by the circumstances to which I have adverted, we shall become more and more ashamed of this injurious custom, which lowers the position of every man influenced by it. I hope that the Members of this Society will endeavour to set a good example in this matter, and I believe they can do so without loss. The public like to consult their own medical adviser, and will wait, even when suffering, until they can see him ; and they also like to go to the Chemist whom they know and in whom they have confidence, and would, I am confident, appreciate him the more if they saw that he appreciated himself and others arouud him, and would apply to him within reasonable hours, if it were necessary so to do, to see him; and parents would show a just discrimination if they were to refuse to send their sons to shops where needless hardships are inflicted upon them. During the last two years the Library has been largely increased, and more recently a Museum has been commenced, which I have no doubt will very soon far exceed in value everything of the kind in the kingdom, excepting those in our metropolitan cities. Many most valuable contributions are placed before you to-night. I hope that this session may be distinguished by the number and value of the papers read to us, and by the successful diligence of our younger Members.

Dr. EDWARDS, in moving a vote of thanks to the President, said that with regard to the adulteration of food, a subject which the President had touched upon, much depended upon themselves whether there should or should not be an encroachment upon their liberties by the appointment of a supervisor of drugs. If they exercised that amount of care and caution in the selection of their drugs which the public had certainly a right to demand from them, they would preserve themselves from such an annoyance. He hoped that such an institution as the Chemists' Association would not be neglected, and the importance of it be passed by and remain unrecognized. He hoped the museum would be extensively used by the Members, and that the specimens exhibited at the meetings would give a fresh impulse to the proceedings, by affording subjects for interesting discussions. He had great pleasure in proposing a vote of thanks to the President for the admirable address which he had delivered. The motion was seconded by Mr. Coupland, and carried unanimously.

After the meeting, a number of the Members and friends of the Association adjourned to their usual annual supper at the Adelphi Hotel. Mr. Abraham occupied the chair, and Mr. Churchwarden Shaw the vice-chair.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

The first Evening Meeting of the present Session was held in the Society's Rooms, Victoria Street, on Friday evening, Oct. 5th, Mr. Woolley, President, in the chair, who delivered the following address to the Members:—

After some observations on the advantages and abuses of association, Mr. Woolley said :—"We ourselves are an illustration of the weakness of isolated individual effort, when competing with a powerful confederacy. A few years ago, the members of our calling were a rope of sand. Scattered over the face of the land, they occupied a doubtful position between the grocer and confectioner on one hand, and the regular medical practitioner on the other. Our ranks reinforced from any mechanical employment, with little previous preparation or education, and the greatest and most legitimate portion of our profits largely shared, and except in large towns, almost wholly absorbed by the dispensary of the medical practitioner, who had a ready and unanswerable argument for his custom, in the fact that he had not sufficient confidence in the neighbouring Druggist to delegate to him the trust. I am not, I am sorry to say, prepared to assert that the picture I have drawn does not still exist in too vivid colours; but there is ground for believing that a better state of things has arisen. Mainly through the enlightened prudence and perseverance of one individual, we were a few years ago prevailed upon to band ourselves together for educational purposes ; and though the mass has not at all times proved as cohesive and homogeneous as might be desired, it is gradually assuming a more organic and uniform structure.

"Let us congratulate ourselves that during this change we have been guided by those who have foreseen that prosperity could only be advanced by our own efforts, and to be durable must be based on a higher standard of education and the cultivation of scientific and general information. We have not importuned the Legislature until we have done something for ourselves ; and even now we ask for no exclusive educational privileges. We do not seek to impose a curriculum of study, through which mediocrity and genius must alike pass. All that we ask the Legislature to require, is the possession of the requisite knowledge, to be tested by an examination before the right is granted of following a delicate and responsible pursuit, such as the practice of Pharmacy. Were this done, there is little reason to doubt that our calling would soon have a higher appreciation in the eyes of the public ; and the members of it, thus feeling themselves recognized as an educated body, and a branch of the medical profession, would elevate their own views of their duties, and naturally set a higher value upon their services. For this higher social position it is our duty to aim, and for this will be required a united and friendly co-operation amongst the adult Members of our body, and a generous spirit of emulation in the rising generation. To these last the present movement offers great advantages, and should be seized upon by them with avidity and gratitude. The brightest rewards of science are open to their grasp, and require only zealous and persevering study for their acquisition. But by those of us whose path in life is fixed, it may be asked what have we to gain from education ? our customers have been satisfied with us hitherto, and will no doubt continue with us to the end. To these I would say, all is not so smooth as it seems even for us. Those who look back for the last few years, and mark the rapid strides which science has made in the arts, the much more general study of Chemistry by the public, and its popularization by photography and electro-chemistry, which have brought chemical nomenclature into establishments where before it was unknown, will see that it is not well to sleep too soundly on the couch we have made for ourselves. The late inquiries, too, into the adulterations of food and drugs, marked although they have been by a spirit of exaggeration and the want of commercial knowledge on the part of their authors, have been received by the public with a morbid anxiety, which shows that they are not unprepared to support us if we firmly testify our determination to aim at the greatest purity in our articles to which we can commercially attain. For this end I know of nothing so likely to be effective as frequent and free discussion among ourselves, and by the preparation, as far as possible, of the pharmaceutical compounds in our own establishments. This of course must be done with judgment and care, for there are many compounds which can be best prepared in large quantities, and by those who give to a few preparations their exclusive care.

"Still we all know that in the beginning of every young man's business-career are many spare hours, at present probably devoted to the concoction of hair grease, table sauce, or perfumery (the almost universal resources of the ambitious or the industrious), which might be more scientifically, if not more profitably, devoted to the preparation of some of the rarer chemicals. The proposed admission of methylated spirit duty free for the purposes of manufacture, *may* offer inducements for the more general preparation of some of the alkaloids, and the facilities now given by the use of gas for evaporation, and all the new appliances of minute apparatus, remove from us the old excuses for ignorance. For us, the days when ignorance was bliss have passed away. The general progress of education will soon enable the youngest of our customers to arraign us for competency or incompetency, and it is for us to say if, amidst a general onward movement, we shall stand still.

"Original investigation, too, even of the simplest character, tends to expand the mind, and fit it for a wider sphere of usefulness; for this we have advantages in our familiarity with the physical appearance of a large number of both natural and artificial substances. The impression also on the public mind is that Chemistry is necessarily a branch of study with us, as shown by the frequent applications to the Druggist for scientific information. Thus, therefore, even on pecuniary and material grounds, I believe that there are ample reasons to induce us to study Pharmacy and Chemistry in their higher scientific departments as a branch of our calling. We should thus secure a parallel and friendly path, on an equal social elevation with that of the medical practitioner. Instead of vieing with each other for the handsomest show-bottle or the most gorgeous shop, we should then rather study to give to them internally the convenience and appliances of the laboratory; and thus, by giving to the scene of our daily labours some of the comforts of a home, learn to love it as such. Our brethren in Liverpool are active, and we are not wont in Manchester to be behind them in energy or the spirit of progress. We have here a worthy object for the display of friendly rivalry—to raise our calling to the dignity of a scientific profession."

At the conclusion of the address, the Chairman called on Mr. Grindon, the Lecturer on Botany, to present the prizes which had been awarded to the successful competitors in the examination which had just been held at the termination of the Botanical Lectures.

Mr. Grindon said he had great pleasure in stating the result of the examination, which had been exceedingly creditable to the students. He was not acquainted with the names of the successful competitors, each one having affixed a motto to his set of answers, and enclosed his name in an envelope bearing a corresponding motto, which envelopes had not yet been opened. There were seven or eight competitors, and their answers to his questions had quite exceeded his expectations. The notes taken by the pupils he found to be singularly correct, and showed that they had not only paid great attention to the lectures, but also that they had studied well at home. The answers with the motto "Florum Scientæ" were the best, and entitled to the prize. The next two sets of answers were both very good, and so nearly equal that it was difficult to decide between them; and if the two gentlemen to whom they belonged would compete again, Mr. G. would award a second prize. The answers of the other competitors were all nearly equal, and well deserved certificates of merit.

The envelopes being opened, the successful candidate proved to be Mr. W. H. Barlow, and the two next in merit Mr. G. S. Woolley and Mr. H. Bryer.

Mr. Grindon very kindly said he should be glad at any time to bring any specimens from his Herbarium to the evening meetings which might be thought interesting to the members.

Mr. Woolley then stated that the prizes awarded at the termination of Professor Calvert's course of lectures on Chemistry last session to the students of the late Chemists' Conversational Society, would now be presented, no previous opportunity of doing so having occurred since the examination.

Mr. Hunt, who had been associated with Professor Calvert in delivering the lectures, said that with respect to the attendance of the class, and their attention to the lectures, he might repeat Mr. Grindon's observations. He and Professor Calvert had been very much pleased with the result of the examination. The amount of information displayed was very good indeed for so short a course—indeed, quite as much as is often to be met with in the colleges. There had been two distinct exami-

nations, and two prizes given—one by the Society, for the best written answers to the questions; the other by Mr. Calvert, to the one who took the best notes, and gave the best answers to questions on those notes. Two of the gentlemen who had competed at the written examination were very nearly equal, but in the other case there was a decided difference. Mr. Calvert's prize had been awarded to Mr. Whieldon, and was presented to him by Mr. Hunt. The Society's prize was awarded to Mr. E. D. Moorhouse, and was presented to him by Mr. Roberton, as Secretary to the late Society.

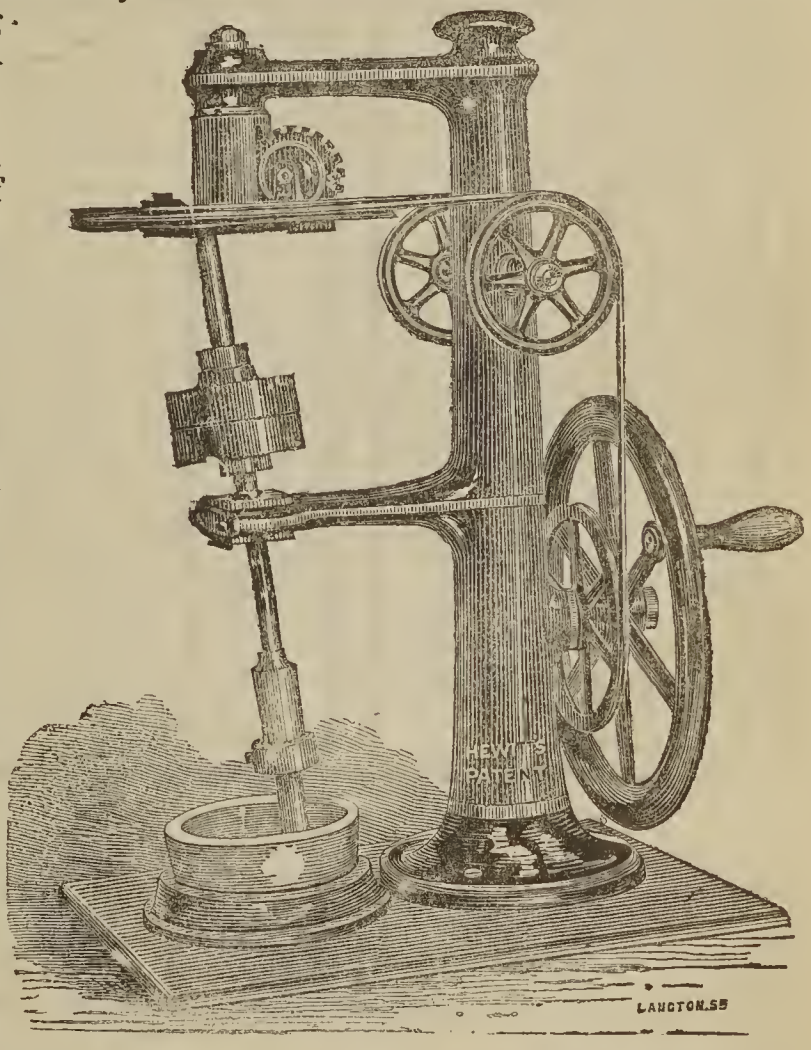
Mr. Moorhouse, on behalf of the students, begged to present their best thanks to Mr. Hunt for his uniform kindness to them, and for the interest he had always displayed in everything connected with their studies.

Mr. Roberton proposed a vote of thanks to the President for the excellent address he had read, which he hoped would appear in the *Pharmaceutical Journal.*

This being seconded by Mr. Wylde, was carried by acclamation.

Mr. Woolley briefly returned thanks to the Meeting for this mark of approbation, and drew the attention of the Members present to some specimens of wood and bark which had a yellow colour, and a bitter, slightly aromatic taste, that have been sent over from Africa, under the idea that they might possibly possess some medicinal properties, or be useful as dye-woods.

One of Hewitt's Pulverizing Machines (which is represented in the accompanying engraving) was exhibited, in which the difficulties and defects of other machines of the kind appear to be effectually overcome, and a rotating motion given to the pestle exactly resembling that produced by the human hand, whilst at the same time its action is so easy, that with the pestle weighted to 12 lbs. or 14 lbs., a very slight amount of labour is required to work it. Various substances, amongst which were borax, cantharides, and Cape aloes were tried with it, which were easily reduced to powder, without creating any dust, and producing scarcely any noise. A very general opinion was expressed in its favour, but there appears one very serious drawback to its extensive use, viz., the price at which it is offered, the smallest size, which is only equal to a No. 4 Wedgewood mortar, being charged £6 10*s.* The patentee would confer a boon on the Pharmaceutist, and create an extensive demand for the machines by reducing the price, but until that is done to a *very considerable* extent, their use will be very limited.



[The Introductory Lecture to the Chemical Class was delivered on Wednesday, October 10th, by D. Stone, Esq., F.C.S., to a very full attendance of students.

ORIGINAL AND EXTRACTED ARTICLES.

ON A NEW FORM OF GAS BATTERY,

Read before the British Association at Glasgow.

BY W. SYMONS.

The ingenious and original arrangement known as Grove's Gas Battery, although always looked upon as an instrument of great philosophical interest, appears to have been little used as an instrument of research and experiment, except in investigations on the combinations of various gases. I have long thought that a modification of it may be usefully employed in many experiments requiring a weak but continuous current, and I believe the following arrangement will be found convenient and economical, as it brings into active operation a far greater amount of the platinum used, and may be easily constructed by students and experimentalists who, like myself, are thrown entirely on their own resources and manipulation for the construction of their apparatus.

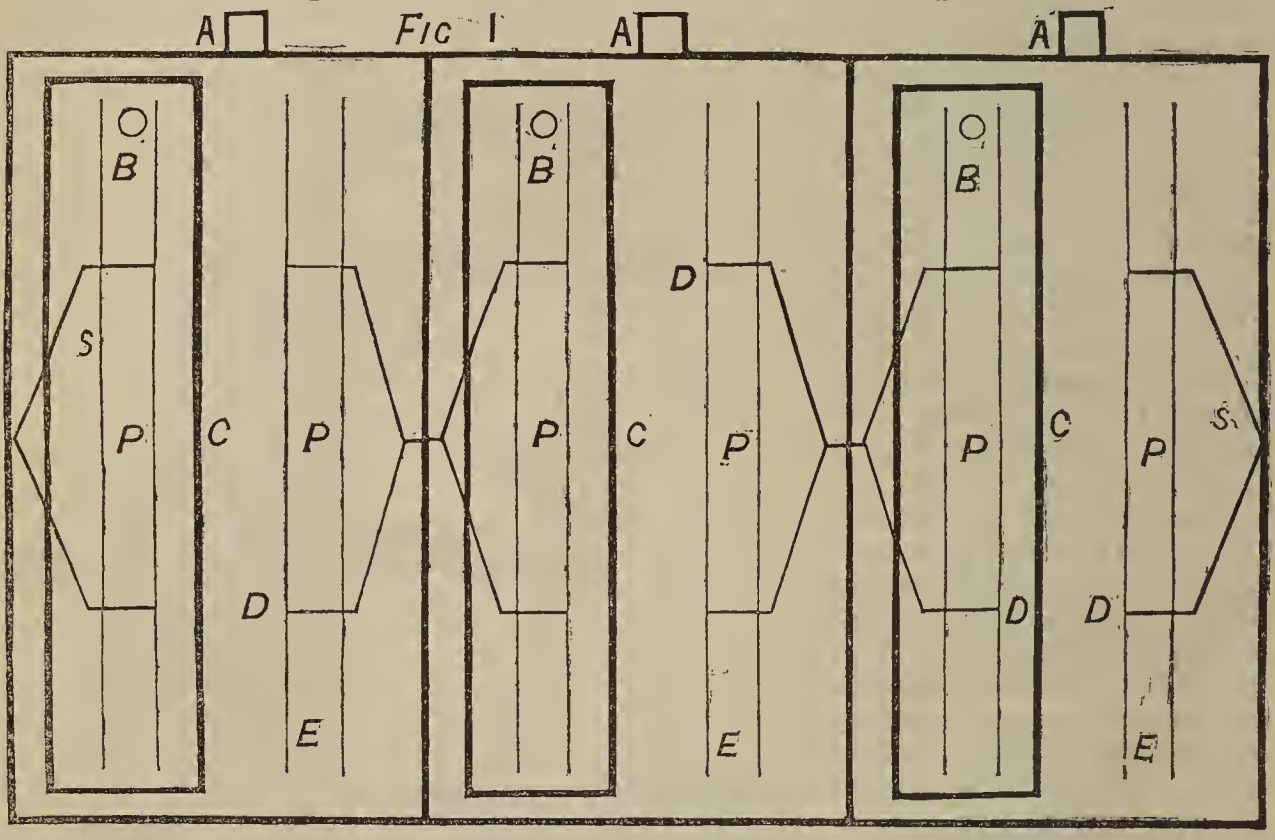


FIG 1

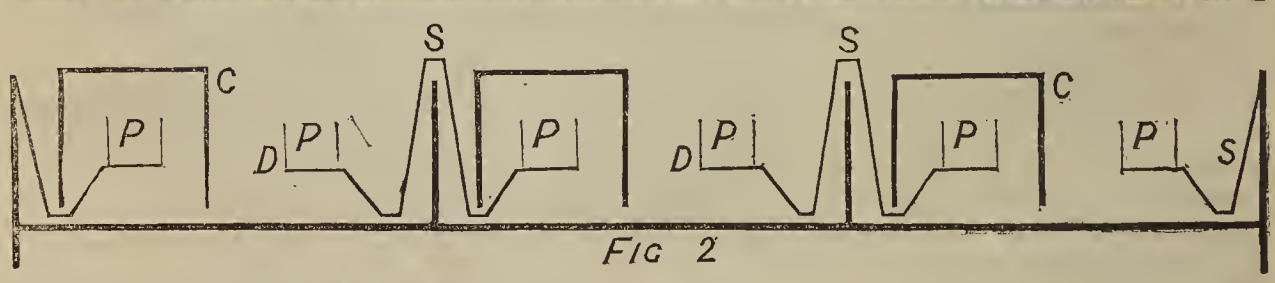


FIG 2

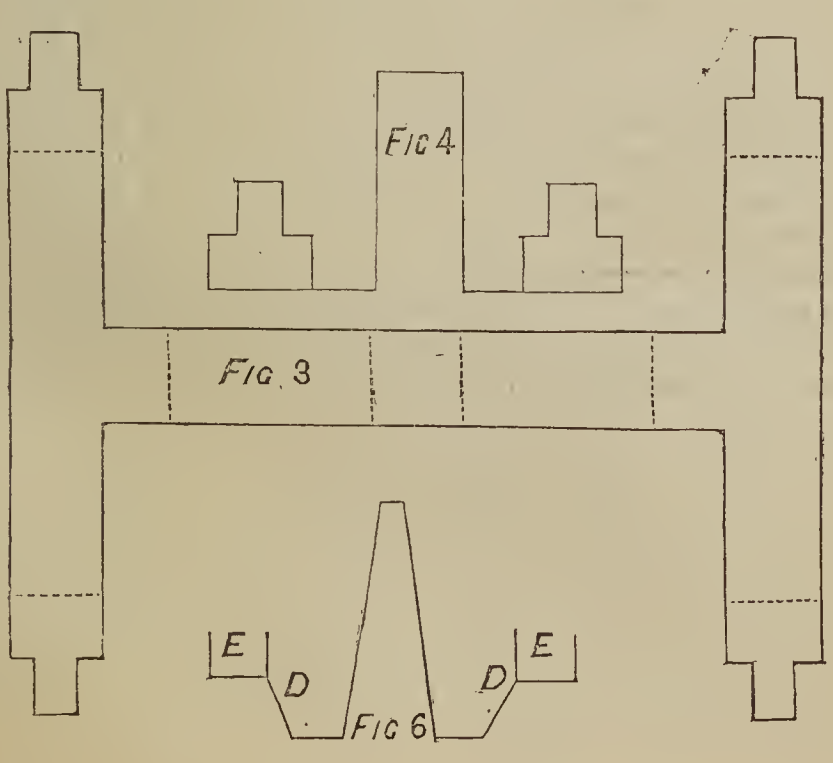
Fig. 1 is a plan, and fig. 2 a section, of three pairs. The tray is made of gutta percha, about one inch deep; it is divided into water-tight compartments, about $2\frac{1}{2}$ inches wide; the length of the tray will depend on the number of cells required, and its breadth on the length of the platinum plates used. A gutta percha tube is fixed at the bottom to communicate with a reservoir of hydrogen. *A* are small projecting tubes to keep the liquid at a uniform level. *B* are tubes perforated through the bottom of the tray and standing above the level of the acid, to admit a constant supply of hydrogen from below. *C* are cells about one inch deep, $\frac{3}{4}$ inch broad, and long enough to cover the platinum strips. These are best composed of glass, but may be made of thin gutta percha with glass on the top. *P* are the platinum plates, $\frac{1}{2}$ inch wide, doubled lengthways into a U

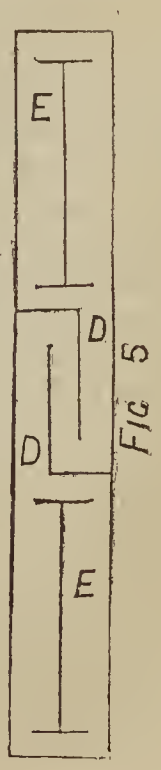
shape, and divided in the middle through a part of their length. The connexions *S* are silver wires twisted together in the middle, passed through the platinum, and attached to the latter at *D* by a blow-pipe: it would economise room were the platinum creased into short zig-zags. The battery, as here described, supposes the use of hydrogen and the atmosphere, but it may be easily constructed for two gases by the addition of tubes at *E* similar to *B*, for the supply of oxygen from below.

The advantages of this arrangement over Grove's, I think, are cheapness of construction, the absence of connexions by binding screws or mercury, the facility for removing the plates to clean, &c., and, above all, the great economy of platinum; for whereas, in Grove's, a platinum plate, for instance 4 inches long and $\frac{1}{2}$ inch broad, would, according to his theory of its action, only have or $\frac{1}{4}$ inch of active surface—in this arrangement it would have sixteen times that amount.

I may be allowed, perhaps, to add a suggestion with regard to apparatus of a totally different kind, such as the condensers, multipliers, &c., used in static electricity where a perfectly smooth conducting surface is required, as in the apparatus described yesterday by Prof. W. Thomson. I believe plate glass gilded is generally used. The substitute I would suggest is common slate—it is much cheaper, far more easily worked, polished, and gilded; perhaps rubbing it over with good plumbago would render it a sufficiently good conductor. This is the plan I have adopted in an electroscope described in the *Chemist* for August. It may also be an advantage, in some cases, that as a conductor it would be free from specific induction.

P.S.—In the following arrangements the necessity of joining two metals is dispensed with, as both the positive and negative plates for adjoining cells are cut from one piece of metal. The first plan can be used with the tray and cells *C*, as described above; and the only disadvantages are using a little more platinum, and a little more difficulty in removing the plates to clean, &c. One pair of plates on this plan were shown in connexion with the above paper, made of platinized silver; but I have found the silver foil is liable to melt when heated in a spirit lamp to render it perfectly clean. Fig. 3 is cut out of thin gutta percha, and bent at the dotted lines so as to take the shape of fig. 4. Fig. 5 is a strip of platinum, not shown so long in proportion as it would be required, cut as represented by the lines, the middle can then be drawn out, and considerably lengthened—this is merely to economise platinum; it is then to be bent as shown in fig. 6, and placed on fig. 4.





The following arrangement I described in a paper sent some months since to this journal, but it appears never to have reached its destination. *A B*, fig. 7,

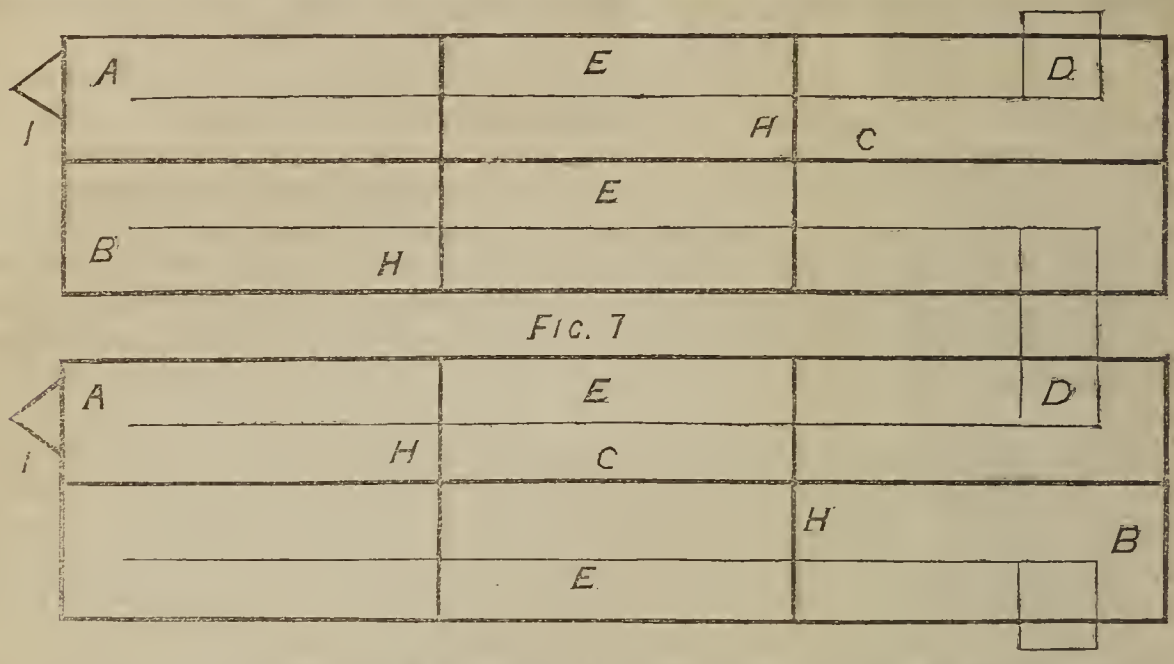


FIG. 7

are plans of two gutta percha cells 1½ inches broad, about the same depth, and any convenient length. The partition *C*, in the middle of each, does not reach to the bottom by ¼ of an inch. The division *A* of each cell has a glass cover, which slides into a groove like the cover of a small paint box; with a little care this may be made so close that when the glass is wet it will be air tight. At *D*, a small piece must be cut out exactly level with the bottom of the glass cover. *E D* is the platinum. Fig. 8 shows its shape. In the cells

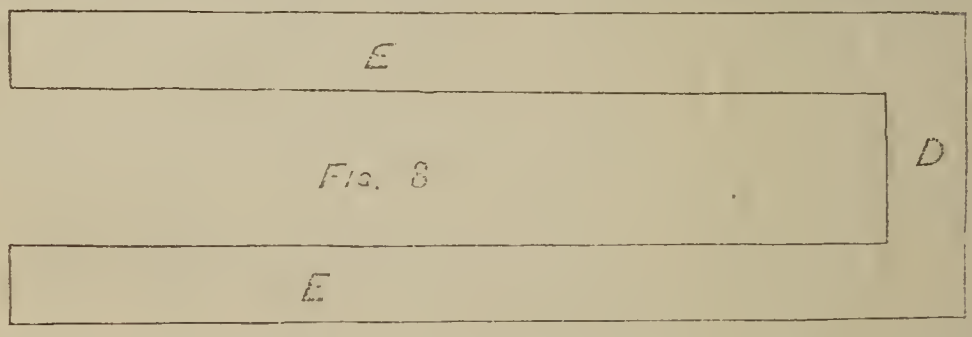


FIG. 8

the parts *E E* are placed perpendicular, supported by moveable pieces of gutta percha, *H*. It will be perceived the piece cut out of the cell at *D* is to admit the connecting piece of platinum under the glass. *I I* are attached to the cells to admit tubes for supplying hydrogen, and to keep the liquid at a uniform level. This description supposes that the division *B* of each cell is left open, receiving its supply of oxygen from the atmosphere; but of course it can be closed in the same manner as *A*, and pure oxygen supplied. To keep the battery in action, a gutta percha tube can be used as a main in connexion with a supply of hydrogen, and in this tube small glass tubes fixed to communicate with the cells through *I*. Another shape for the plates has suggested itself to me, but I have not yet tried it. Fig. 9 shows the platinum as cut. Fig. 10, an end view of the same,

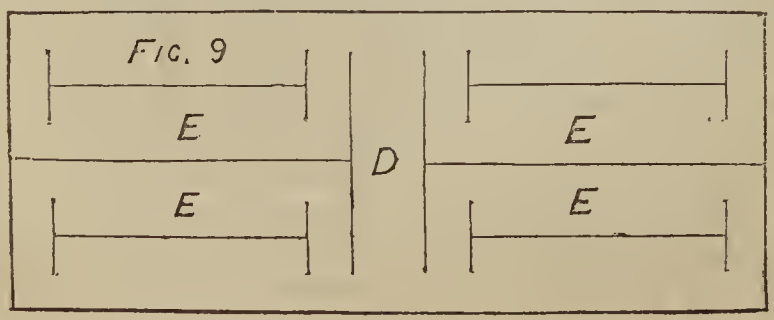


FIG. 9

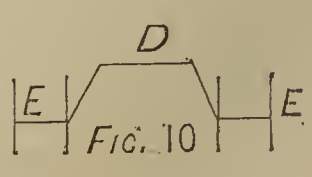


FIG. 10

as bent for use, the letters *D E* showing the same parts in the two figures. By this arrangement there will be two surfaces of platinum in each division of the cells. The cut *D* must in this case of course be in the middle, and not at the end of the cell.

I believe either of these plans will be equally effective, and the constructor will probably be guided by the most economical use of the platinum foil in his possession; but the first plan will be found the most economical and convenient in practice. Possibly the silver may be corroded by the acid, especially should it not be pure; but I have not found it the case, although I have kept the battery in action for forty hours together, and also had the same plates immersed nearly as long in acid more than three times the strength of that used in the battery. Should this, however, be the case, the silver could be replaced by gold.

Dunster, 16*th October*, 1855.

PRACTICAL RULES AND RECIPES IN ELECTRO-DEPOSITION.

BY GEORGE GORE, ESQ.

(*Continued from page* 161.)

201. Gold has been deposited by the ordinary wash process, the single cell, and the battery process; and from a variety of solutions, among which are the oxide of gold dissolved in a solution of sulphite of potash, hyposulphite of gold, iodide of gold and potassium, bromide, terchloride, cyanide of gold and potassium, and sulpho-cyanide of gold and potassium.

202. Gold may be obtained in a state of extremely minute division, by adding a solution of protosulphate of iron to a solution of terchloride of gold as long as a precipitate is produced. The greenish-brown precipitate is finely divided gold, and should be well washed with water.

203. Oxide of gold is formed by adding a cold solution of caustic potash or magnesia to a solution of terchloride of gold, until it ceases to produce a precipitate; filter, and wash the precipitate first with water acidulated with nitric acid, and then with water alone.

204. To make iodide of gold, we either digest oxide of gold for a long time in hydriodic acid, or else add a solution of iodide of potassium to a solution of chloride of gold as long as a precipitate is formed. The precipitate should be washed with cold water; it is of a yellow colour, insoluble in cold water, but freely soluble in a solution of iodide of potassium.

205. Bromide of gold may be made by digesting either gold in the state of a fine powder (202) or oxide of gold, in bromine contained in a stoppered bottle; it is a salt of a rich red colour, and soluble in water.

206. Terchloride of gold, commonly known as chloride of gold, is the most usual salt of the metal, and its preparation therefore requires particular explanation; it is formed as follows:—Take a mixture of one measure of nitric acid, and either two or three measures of hydrochloric acid (this mixture is termed aqua regia), make it hot, and add to it small pieces of pure gold as long as it is dissolved; during its solution gas will be evolved; when it is all dissolved, evaporate the liquid at a moderate temperature, until it becomes of a dark ruby-red or of a yellow colour, and crystallizes into a mass on cooling; this substance is terchloride of gold, and contains three equivalents of chlorine and one of gold if it is too much evaporated, chlorine gas will be evolved, and the salt will contain free metallic gold, which will be precipitated on dissolving it in water. The colour of the salt depends upon the proportions of the ingredients and the manner of using them; to make yellow chloride, add together in a glass vessel three parts of hydrochloric acid, one part of nitric acid, one part of water, and one part of fine gold; cover the vessel with a plate of glass, make the mixture quite hot, and continue the heat until the red vapours cease; f all the gold is not dissolved, add more of the liquid mixture,

and treat as before; when all the red vapours cease, remove the plate of glass and cover the vessel with folds of blotting-paper, and continue the heat until a cold glass rod immersed in the liquid becomes covered on cooling with solid yellow chloride of gold; then slowly cool the liquid and crystallize;—the red chloride is prepared in the same way, except that the aqua regia is composed of two parts of hydrochloric acid and one part of nitric acid, and more of it is added than is necessary to dissolve all the gold. One ounce of gold dissolved in four ounces of aqua regia, and crystallized, will make one ounce and 165 grains of the ruby red mass.

207. "Cyanide of gold is formed by cautiously adding a solution of cyanide of potassium in six parts of water, to a normal solution (*i. e.* not containing any free acid) of chloride of gold containing five parts water to one part of the chloride, until a copious yellow precipitate settles down; if more cyanide of potassium is added, the precipitate is dirty yellow, and is more quickly deposited; a still larger quantity renders it orange-yellow. It is a crystalline powder, permanent in the air, by ignition it is resolved into gold and cyanogen gas; it is not decomposed or dissolved by sulphuric acid, hydrochloric acid, nitric acid, or aqua regia, unless freshly precipitated, and then very slowly; it is not decomposed by sulphuretted hydrogen; hydrosulphate of ammonia dissolves it slowly but completely, forming a colourless solution, from which by the addition of acids, sulphide of gold is precipitated; it dissolves in aqueous solutions of ammonia, hyposulphite of soda, or alkaline cyanides, but not in water, alcohol, or ether."

208. Gold has been deposited by the simple immersion or "water-gilding" process, in the following liquids:—1st, Dissolve five troy ounces of fine grain gold in fifty-two avoirdupois ounces of hot aqua regia, until no more red or yellow vapours arise, pour off the clear liquid when cool, and add twenty pounds of purified bicarbonate of potash, and boil the mixture for two hours; the articles to be gilt are simply immersed in the liquid and moved about in it from a few seconds to one minute, according to the temperature of the liquid, the kind of metal immersed, and the newness of the liquid; a new liquid gilds more quickly than an old one, and warmth favours the action; and 2d, for gilding silver articles, dissolve a mixture of equal parts of sal ammoniac and bichloride of mercury (corrosive sublimate) in nitric acid; add pure grain gold to it, and apply heat until half the liquid has evaporated; the articles to be gilded are made hot, and the liquid applied to their surfaces.

209. Joseph Steele took out a patent, August 9, 1850, for a gilding solution, which is prepared as follows:—Dissolve one ounce of gold in a mixture of eight ounces of nitric acid and four ounces of hydrochloric acid, and evaporate the solution to dryness; fuse together twenty-four ounces of prussiate of potash and twelve ounces of carbonate of potash, and when the mass is cold, dissolve it in two or three gallons of distilled water, and boil the liquid five or six minutes; cool and filter the solution, then add the chloride of gold, and boil the mixture fifteen minutes. The articles to be gilded are immersed in the resulting liquid in contact with a piece of zinc.

210. Gold has been deposited by the battery process from a solution of hyposulphite of gold and soda. The solution is formed by adding chloride of gold to hyposulphite of soda dissolved in water. It is not a very good liquid for practical purposes.

211. Mr. Woolrich has used the sulphite of gold and potash for gilding by the battery process. His solution was formed by dissolving sulphite of potash in water, saturating five-sixths of the resulting liquid with oxide of gold, and then adding to it the other sixth part of sulphite solution to form *free* sulphite.

212. Gold has also been deposited by the battery process from bromide of gold. The solution was formed as follows:—Make a mixture of equal parts of bromine and alcohol, and of this mixture take one part, acetic acid one part, and four parts of water acidulated with a few drops of sulphuric acid. Mix

them together, and saturate the resulting liquid with gold, by suspending in it two gold electrodes, connected with a suitable battery, and, when saturated, add three times its volume of water containing a few drops of sulphuric acid.

213. An aqueous solution of chloride of gold has also been used for depositing but it is a very inferior liquid; all the common metals decompose it.

214. By far the best solution which has yet been used for practical electro-gilding, consists of a solution of the double cyanide of gold and potassium dissolved in water, and some *free* cyanide of potassium added. This solution was first patented by Messrs. Elkington, and may be formed in several ways; either by adding precipitated gold (202), oxide of gold (203), or almost any salt of gold, to a solution of cyanide of potassium, as long as the precipitate formed is all re-dissolved. Or it may be made passing a current of electricity by a gold anode through a solution of cyanide of potassium. In making it by the chemical method we generally proceed thus:—A solution of terchloride of gold is first formed by dissolving the salt (206) in water. To this we add, as long as a precipitate is produced, either a cold solution of caustic potash, magnesia, aqueous ammonia, or a solution of carbonate of ammonia. If either of the two first substances are used, the precipitate consists of oxide of gold; but with the other two it is aurate of ammonia or fulminate of gold, a very explosive compound. In each case, especially with the potash, ammonia, or carbonate of ammonia, care should be taken to discontinue adding it immediately the precipitation ceases, otherwise some of the gold will be re-dissolved. Allow the liquid to settle, pour off the clear part, and immerse a piece of bright zinc in it for a few minutes, to test if it still contains any gold, if it does, the zinc will be gilded. The precipitate, after being well washed by the successive addition of quantities of clean water, should be added whilst still wet (to avoid explosion and make it dissolve quickly) to a solution of cyanide of potassium, consisting of one pound of cyanide to each gallon of water, until the liquid is saturated. Then about one-fifth more of a similar cyanide solution should be added, to form *free* cyanide. A solution containing one ounce of gold to the gallon will do very well, but it may contain even four ounces to the gallon.

215. If the wash waters contain a little gold, a sheet of bright zinc should be repeatedly immersed in them, and the gold removed from it by a hard brush and water, acidulated with a few drops of sulphuric acid. Or a solution of proto-sulphate of iron should be added to them as long as a greenish-brown precipitate (which is metallic gold) is produced. The greater the quantity of *free* acid or aqua regia in the chloride solution, and the larger the excess of ammonia or carbonate of ammonia added, the greater is the quantity of gold which dissolves in the wash waters. If, in dissolving the perchloride of gold in water, there remains a small quantity of a greenish-yellow powder, the addition of a little aqua regia and application of heat will cause it to dissolve.

216. For a small quantity of gold solution, the most convenient way of making it is by the battery process, thus:—Dissolve one pound of cyanide of potassium in one gallon of hot distilled water, immerse a small porous vessel in it, nearly filled with the same solution, place a large gold anode in the outer liquid, and a small piece of bright iron or copper in the liquid of the porous cell, and connect them with about two or three pairs of batteries, the gold with the silver of the battery, and the copper or iron with the zinc. The anode will quickly dissolve, and, as the process progresses, the outer liquid should be occasionally stirred, and the cathode transferred to the outer liquid, to see if gold is deposited upon it; and when it receives a deposit of satisfactory appearance, the process should be stopped, and the liquid of the porous cell mixed with the remainder. The solution should be kept hot all the time, and be maintained at about 100° or 150° Fahr., when in practical working.

217. Formula of M. De Ruolz.—"Dissolve 10 parts of cyanide of potassium in 100 parts of distilled water, filter, and add one part of cyanide of gold,

prepared with care, well washed, and dried out of the influence of light. Keep the mixture in a closed glass vessel, at a temperature of 60° to 77° Fahr., for two or three days, out of the influence of light, with frequent stirring."

218. Formulæ of "M. J. L."—1st. "Dissolve 10 parts of ferrocyanide of potassium and one part of dry terchloride of gold in 100 parts of water. Oxide of iron will be precipitated. Boil the solution two or three hours in a porcelain or glass vessel, until a precipitate collects at the bottom, and the supernatant liquid is transparent and of a canary yellow colour. Filter the liquid, and dilute it with three or four times its volume of water." 2nd. "Take 31 grammes and 25 centigrammes of oxide of gold, 5 hectogrammes of cyanide of potassium, and 4 litres of water. Boil them together half an hour. The resulting solution must be worked hot, and may be used to gild copper, brass, and silver."

219. Formula of M. Becquerell.—"Dissolve 1 part of terchloride of gold and ten parts of ferrocyanide of potassium in 100 parts of water; filter, to remove the cyanide of iron; add 100 parts of a saturated solution of ferrocyanide of potassium, and dilute the mixture with once or twice its volume of water. In general the tone varies according as the solution is more or less dilute. The colour is most beautiful when the liquid is most dilute and most free from iron. To make the surface appear bright, it is sufficient to wash the article in water acidulated with sulphuric acid, and rub it gently with a piece of linen cloth."

220. Of M. Levol, for gilding silver.—"Dissolve neutral chloride of gold in water, and then add a solution of sulphocyanide of potassium, until the precipitate formed is re-dissolved. The liquid will retain a slightly acid reaction; if it has lost it, we must renew it by the addition of a few drops of hydrochloric acid."

221. Of M. Fizeau.—1st, "Dissolve one part of dry chloride of gold in 160 parts of distilled water, and add to it little by little a solution of carbonate of potash in distilled water, until the chloride begins to become cloudy. This liquid may be used immediately." 2nd. Used by M. Lerebour for gilding by the battery process.—"Dissolve one gramme of chloride of gold and four grammes of hyposulphite of soda in one litre of distilled water."

222. Of M. De Briant.—"Dissolve 34 grammes of gold in aqua regia, and evaporate the solution until all excess of acid is removed. Then dissolve the chloride of gold in 4 kilogrammes of warm water, and add to it 200 grammes of commercial magnesia. The gold will be precipitated in union with the magnesia. Filter, wash the precipitate with distilled water, digest it with a mixture of 20 parts of water and 3 parts of nitric acid, to remove the magnesia, and wash the remaining oxide of gold with water, until the wash waters exhibit no acid reaction. Next dissolve 400 grammes of ferrocyanide of potassium and 100 grammes of caustic potash in four litres of water, add the oxide of gold, and boil the liquid about twenty minutes. When the gold is dissolved there remains a small amount of oxide of iron precipitated, which may be removed by filtration, and the liquid of a fine gold yellow colour is ready for use. It may be used either hot or cold."

223. Of Mr. Alexander Parkes, patent for depositing solid articles in gold by the battery process, March 29, 1841.—Dissolve one ounce of pure gold in aqua regia, evaporate the solution to dryness, then add two gallons of water and sixteen ounces of cyanide of potassium, and work the resulting solution at a temperature of about 120° or 130° Fahr.

224. Cyanide gilding solutions are used hot, at a temperature of about 150° Fahr., the vessel containing the solution being either contained in a glazed iron vessel and heated by gas flame or by a stove, or contained in a stoneware or glass pan immersed in boiling water. The articles to be gilded are connected with about two or three pairs of batteries, and immersed in the solution a few minutes, if they are small and require only a thin coating; but if they are large and require a stout deposit, they must be immersed several times for a

longer period, and brushed between each immersion. Articles formed of iron or steel are coated with copper in a cyanide coppering liquid before receiving a deposit of gold, otherwise the gold will not adhere. The loss of water by evaporation is supplied by the addition of a little distilled water to the solution, after the day's gilding is finished.

225. In regulating the colour of gold deposited by the electro process, there are several circumstances to be taken into consideration, the chief of which are: 1st. The temperature of the solution; 2nd. The quantity of the current; and, 3rd. The relative size of the electrodes. If with a good solution at a given temperature, and a rich deep orange-yellow, gold is being deposited, the colour of the deposit may be changed to a lighter yellow by working the solution at a lower temperature, or by decreasing the size of the dissolving metal and removing the electrodes further asunder, or by working at a lower heat with a smaller anode, but at the same distance as before. A high temperature of the liquid tends to give a gold of a deep warm colour with a tendency to brown, especially if the anode is rather large, or the quantity of the current passing is rather free, or the deposit is becoming rather thick. To succeed in obtaining a light and clear bright yellow colour, a small anode, low temperature of liquid, and weak battery power with slow deposit are required, and be careful only to put on a thin coating, that the colour may not pass into too dark a shade. The usual method of regulating the colour is to use a copper anode instead of a gold one.

226. If a solution deposits a dull, earthy-looking gold of a deep brownish colour with every variation of the battery and electrodes, it is probable that it will not yield a clear bright yellow gold if the temperature is lowered, but will deposit dull-looking metal; in such a case the defect lies in the liquid, probably in its chemical composition, and may have been produced by some impurity, by wrong proportion of the ingredients, or by evaporation of some of the cyanogen; in the latter case, an addition of cyanide of potassium will generally improve it; or it may have been produced by disturbance of the liquid, in which case, perseverance in working it will gradually restore its good working condition.

227. "The crystallized double cyanide of gold and potassium dissolves in seven parts of cold and in half a part of hot water (Himly), in four parts of cold and in 0.8 parts of hot water (Glassford and Napier); it dissolves very sparingly in alcohol. Its aqueous solution gilds copper and silver by simple immersion, especially if hot, and the copper and silver dissolve in it."

228. "Gold precipitated from a solution of chloride of gold by protosulphate of iron, dissolves in a boiling solution of cyanide of potassium; a hot solution of cyanide of potassium will also dissolve ordinary metallic gold if air be present. Both oxide of gold and aurate of ammonia dissolve completely in a solution of cyanide of potassium, and form the double cyanide of gold and potassium. Cyanide of gold requires twenty-three parts of cyanide of potassium dissolved in water to dissolve it. For every one part of gold to be dissolved by the battery process, six parts of cyanide of potassium, dissolved in from two to four times their quantity of water at 100° Fahr., is required; two electrodes of gold being connected with a suitable battery until the required quantity of gold is dissolved."

229. "The crystallized double cyanide of gold and potassium fuses and effervesces by heat, and if air be present, is resolved into cyanogen gas, ammonia, and cyanide of potassium. Its complete decomposition requires a strong red heat. When it is very strongly ignited with an equal weight of carbonate of potash, a button of metallic gold is obtained. When heated with sulphuric acid, it gives off hydrocyanic acid gas, and after ignition leaves a mixture of gold and sulphate of potash. Iodine sets free cyanogen gas, forms iodide of potassium, and throws down the cyanide of gold. The aqueous solution of cyanide of gold and potassium gilding solution, when mixed with hydrochloric, sulphuric, or nitric acid, slowly deposits cyanide of gold; and when boiled

down with hydrochloric acid, it is completely resolved into cyanide of gold and chloride of potassium. Similar effects are produced by sulphuric or nitric acid, and even by oxalic, tartaric, and acetic acid. To obtain the remaining gold from gilding solutions which have become inactive, they should be evaporated to dryness, the residue finely powdered and intimately mixed with an equal weight of litharge, fused at a strong red heat, and the lead extracted from the alloy button of gold and lead by warm nitric acid. The gold will then remain as a loose, yellowish-brown, spongy mass (Bottger, *J. Pr. Chem.*, 36, 169; confirmed by Elsner, Redtel, and Hessenberg, *J. Pr. Chem.*, 37, 447, 38, 169, and 256)." See also preceding paragraphs 179, 180, 183, 184, 185, 189 to 199 inclusive.

230. Platinum may be deposited either by simple immersion, single-cell, or battery process. Its only common salt is the bichloride, which is formed by adding bits of platinum foil to hot aqua regia as long as gas is evolved from the metal. The solution is then of a deep red colour, and should be evaporated nearly to dryness, in order to obtain the salt. Nearly all the compounds of platinum are made from this salt or its aqueous solution. The chemical equivalent of platinum is 98.7, and of bichloride of platinum 169.7.

231. Nearly all metals decompose the aqueous solution of this salt, and become covered with a deposit of platinum in it by simple immersion. We have platinized silver for Smee's batteries, by immersing it in a solution of bichloride of platinum, containing one-fourth its volume of nitric acid, at 60° Fahr.; or it may be platinized by immersing it a short time in a very hot solution of the bichloride alone. To platinize common metals, evaporate a solution of the bichloride until you obtain a salt from it. Mix one part of this with eight parts of common table salt, and dissolve the mixture in 100 parts of water. Make the solution quite hot, and immerse the articles in it.

232. By the battery process platinum has been deposited from its iodide, bromide, bichloride, and the double chloride of platinum and sodium. The solution of double chloride of platinum and sodium is formed by adding one equivalent (58.5 parts) of common salt to one equivalent (169.7 parts) of bichloride of platinum, and dissolving the mixture in water. The resulting solution requires a very weak battery and a small anode of platinum to obtain a reguline deposit. A deposit of platinum in the state of a black powder may be very easily obtained from it by adding a little sulphuric acid to the solution, and using a much stronger battery and a larger anode. The usual method of platinizing silver plates for batteries is by the single cell process, as follows:— Add a small quantity of solution of chloride of platinum to some water until the water is of a brown colour, and a few drops of sulphuric acid. Immerse a small porous cell in the solution, containing dilute sulphuric acid and a piece of zinc. Place the piece of silver in the outer liquid, and connect it with the piece of zinc by a wire. As soon as the two liquids soak through the porous cell and touch each other, deposition will commence, and the silver soon become covered with a jet-black coating of platinum powder. The silver should then be dipped several times in water and dried, care being taken not to rub off the deposit, which is not very strongly adherent. A good solution for depositing reguline platinum is made by dissolving bichloride of platinum and chloride of sodium in a solution of "potassa fusa."

233. Palladium is a metal very easily deposited by the battery process from a solution of the double cyanide of palladium and potassium. To form the liquid, dissolve some cyanide of potassium in water, immerse a large palladium anode and a small bright cathode of iron or copper in it, and connect them with a small battery of one or two pairs, and continue the action until the cathode receives a good deposit. The resulting solution is an excellent one. It acts upon the anode freely, holds plenty of metal in solution, conducts easily, yields its metal freely, and in the reguline state, and is therefore easily worked. It may be used either hot or cold, and gives a fine white deposit of metal upon

iron. Cyanide of potassium solution appears to act upon palladium with an uncommon energy.

234. A thin deposit of palladium may be used instead of gold for fixing daguerreotype pictures, and is considered by some persons to be superior to gold for that purpose, and to impart a finer tone to the picture. It is deposited by the battery process, the plates being immersed in the solution a greater or less length of time, according to the size of the plate, the strength of the battery, and the condition of the liquid.

235. Attention was for a long time directed to the discovery of solutions whereby brass, bronze, and other alloys might be deposited in the reguline state, and various liquids have from time to time been patented or used for this purpose. M. De Ruolz, in 1841, deposited brass from the cyanides of zinc and copper dissolved in a solution of cyanide of potassium, but found the process too expensive for practical use. "Copper articles may be superficially brassed by boiling them in a solution of bitartrate of potash with zinc amalgam, or by boiling them in dilute hydrochloric acid with some bitartrate of potash and zinc amalgam."

236. Charles De Salzede took out a patent, September 30, 1847, for depositing brass and bronze. He proceeds as follows:—Dissolve 12 parts of cyanide of potassium in 120 parts (of 5000 parts) of distilled water, then add 610 parts of subcarbonate of potash, 48 parts of sulphate of zinc, and 25 parts of chloride of copper to the remainder of the water, and heat the mixture from 144° to 172° Fahr.; and when the salts are entirely dissolved, add 305 parts of nitrate of ammonia. Allow the liquid to remain undisturbed for twenty hours, and then add the solution of cyanide of potassium. Allow it to subside, and then draw off the clear liquid, which is ready for use. Use a large brass anode and a strong battery. Another liquid he uses for brassing consists of 5000 parts of water, 500 parts of subcarbonate of potash, 35 parts of sulphate of zinc, 15 parts of chloride of copper, and 50 parts of cyanide of potassium. For a bronzing solution he uses 25 parts of chloride of tin, in place of the sulphate of zinc of the first bronzing liquid, and proceeds as with that liquid. And for a second bronzing solution he uses 12 parts of chloride of tin instead of the sulphate of zinc of the second bronzing liquid, the solution being at a temperature of about 77° to 97° Fahr.

237. Brunel's recipe.—Take 25 parts of nitrate of ammonia, 50 parts of carbonate of potash, 4 parts of sulphate of zinc, and two parts of chloride of copper. Dissolve them together in cold water, and use the resulting solution with a brass anode and strong battery.

238. Russell and Woolrich's patent, dated March 19, 1849.—Take 10 pounds of acetate of potash, one pound of acetate of zinc, and 10 pounds of acetate of copper, dissolve them in five gallons of hot water, then add as much of a solution of cyanide of potassium as will precipitate it, and re-dissolve the precipitate, and in addition add about one-tenth more cyanide of potassium in excess. Use either a brass anode, or two anodes, one of zinc and one of copper.

239. W. E. Newton's patent, dated July 29, 1853.—Improvements in depositing metals and alloys of metals, brass, bronze, and an alloy of zinc, tin, and copper. For depositing zinc, he uses: 1st. A solution composed of chloride of zinc mixed with either chloride of ammonium, potassium, or sodium, and dissolved in water; 2nd. A solution of acetate of zinc mixed either with acetate of ammonia, potash, or soda; 3rd. A saturated solution of carbonate of zinc in a solution of carbonate of ammonia; 4th. Tartrate of zinc dissolved in either a solution of tartrate of ammonia, potash, or soda, and to 1000 parts of either of these solutions of tartrate of zinc marking three degrees on the salinometer, he adds thirty parts of sal ammoniac, and eighty parts of hydrochloric acid; 5th. Citrate of zinc dissolved in water containing an excess of citric acid; and 6th. Tartrate of zinc dissolved in water containing an excess of tartaric acid. To

form a brassing solution, he takes either of the foregoing liquids, and adds to it a suitable proportion of the analogous salt of copper, and mixes them together.

240. For depositing copper upon wrought or cast-iron either by simple immersion or by the battery process, he uses ;—1st. 1000 parts of a solution of acetate of copper marking three degrees on the salinometer, hydrochlorate of ammonia thirty parts, and hydrochloric acid eighty parts ; and 2nd. An aqueous solution of nitrate of copper, rendered soluble in water by the addition of citric acid.

241. For bronzing:—Dissolve together in water the double tartrate of copper and potash, and the double tartrate of the protoxide of tin and potash, with or without the addition of caustic potash.

242. For depositing the alloy of zinc, tin, and copper, he uses a solution composed of the three following substances mixed together in suitable proportions, and dissolved in water :—Double cyanide of copper and potassium, zincate of potash, and stannate of potash ; the zincate of potash is formed by fusing oxide of zinc with caustic potash, and the stannate of potash either by fusing oxide of tin with caustic potash, or by dissolving it in a solution of potash ; or he uses the three following substances mixed together in suitable proportions and dissolved in water, viz., the double tartrates of copper and potash, of zinc and potash, and of tin and potash.

243. For a brassing solution—1st. He dissolves oxide of copper in a solution of cyanide of potassium, adds oxide or any other salt of zinc, and then adds a slight excess of cyanide of potassium and liquid ammonia, and works the solution at about 120° to 140° Fahr. ; or, 2nd. He dissolves any salt of zinc in a solution of cyanide of potassium, and adds to it a solution of oxide of copper in liquid ammonia.

244. For bronzing he dissolves oxide, or any other salt of copper, in a solution of cyanide of potassium, and chloride of tin in a solution of caustic potash, and mixes the two liquids together in suitable proportions. In each case he uses an anode composed of a suitable alloy.

245. W. Newton's patent, dated August 5, 1853. Deposition of brass upon cast-iron :—1st. To make coppering liquid : Precipitate a solution of sulphate of copper by carbonate of potash, wash the precipitate, and dissolve it in a solution of cyanide of potassium. 2nd. To make zincing liquid : Precipitate a saturated solution of sulphate of zinc by carbonate of potash, wash, and dissolve the precipitate in a solution of cyanide of potassium. 3rd. To make brassing liquid : Mix the two foregoing solutions together in suitable proportions. Work each of these liquids by the battery process, with an anode of suitable metal. The cast-iron articles are first coated with zinc in the zincing liquid, then with copper in the coppering liquid, and finally with brass in the brassing liquid ; by this means the brass will adhere firmly. 4th. To make another zincing liquid : Precipitate a solution of sulphate of zinc by ferrocyanide of potassium, wash the precipitate and dissolve it in a solution of cyanide of potassium. 5th. A second brassing liquid : Precipitate a solution of sulphate of copper by carbonate of potash, wash the precipitate, and dissolve it in the preceding zincing liquid in suitable proportion. Use this solution in the same manner as the previous brassing liquid.—A brass anode should be used in the brassing solution ; if a copper one is used the deposit will contain an excess of copper.

246. Joseph Steele's patent, dated August 9, 1850 :—Dissolve $2\frac{1}{4}$ pounds of American potash in six gallons of hot water, and filter the solution ; also dissolve $2\frac{1}{2}$ ounces of acetate of copper in half-a-pint of strong liquid ammonia, and add it to the first liquid with stirring, also add four or five ounces of sulphate of zinc, and stir till dissolved ; and, finally, add two ounces of cyanide of potassium, filter, and use the resulting solution at 100° Fahr. with a brass anode. To obtain a dark-coloured brass add more acetate of copper, and to obtain it of a lighter colour add more sulphate of zinc.

247. Morris and Johnson's patent, dated December 11, 1852 (see *Newton's*

Journal of Inventions, August, 1853). Dissolve one pound of cyanide of potassium, one pound of commercial carbonate of ammonia, two ounces of cyanide of copper, and one ounce of cyanide of zinc, in one gallon of water; and use the solution at 150° Fahr. with a large anode of brass and a powerful battery; or a solution may be taken of one pound of cyanide of potassium and one pound of carbonate of ammonia, dissolved in one gallon of water, and saturated with copper and zinc by means of a strong battery, with large brass anode and small cathode, until the latter receives a good deposit of brass, the solution being at about 150° Fahr. To increase the proportion of copper in the deposit, either add cyanide of potassium or raise the temperature of the liquid; and to increase the proportion of zinc in it, either add carbonate of ammonia or lower the temperature. Always use a large brass anode.

248. Of the different solutions for depositing brass that we have tried, this one is much the best, as by it reguline and thick deposits of brass of uniform colour, and of any desired composition, may be obtained. It is not an expensive liquid. It acts with moderate strength upon the anode, and holds a sufficient quantity of the alloy in solution. It conducts electricity with average facility, it yields its metal in the reguline state very uniformly, and bears a great variation of the battery power without injuring the character of the deposit; and is therefore very easily worked. It does not act strongly upon the baser metals, cast iron, wrought iron and steel. It is not decomposed by exposure to the atmosphere, to light, or heat, in such a way as to injure its depositing power. Its defects, compared to what we should theoretically consider a perfect depositing liquid (of which we have few, if any, examples), are—that it requires to be worked hot, and with considerable intensity of battery power, to make the anode dissolve rapidly, the solution conduct copiously, and to cause a rapid deposit. And it evolves an abundance of gas at the cathode when working, which indicates that part of the battery power is expended in decomposing the water of the liquid, and setting free its hydrogen with the metallic alloy.

MANUFACTURE OF YELLOW PRUSSIATE OF POTASH, RED PRUSSIATE OF POTASH, PRUSSIAN BLUE, CYANIDE OF POTASSIUM, &c.

Yellow Prussiate of Potash, Ferrocyanide of Potassium.—One ton of suitable nitrogenized matter (as woollen rags, blood, &c.), in a dry state, mixed with from three to four cwts. of pearlash in powder, and from fifty to sixty pounds of scrap iron, are thrown by degrees into a thick iron pot, previously brought to a bright cherry-red heat; and after each addition, the whole contents of the pot are to be stirred with a heavy iron poker or bar, until the mass assumes a pasty consistence, when more of the mixture is to be added and similarly treated, until the pot is about half full. After this the heat is maintained for fifteen or twenty minutes, when the charge is ladled out to make room for another operation. The pasty mass is commonly allowed to cool and harden, after which it is reduced to powder and boiled in water. Some manufacturers, however, plunge it at once, whilst still red hot, into cold water, considering that some advantage is thereby gained. As the prussiate of potash is very soluble in boiling water, the fused mass rapidly disintegrates beneath the action of this fluid, and in a short time the whole is resolved into a solution of the prussiate, carbonate, and sulphate of potash, and into an insoluble magma of carbon and scrap-iron. By filtration the saline fluid is separated from the insoluble portion, and after evaporation furnishes crystals of prussiate of potash, which, by re-solution and crystallization, are rendered sufficiently pure for the market. In general, one ton of dried blood or woollen rags, with about three cwts. of good potash, will produce from 2 cwts. to 2½ cwts. of prussiate of potash.

The following mode of preparing prussiate of potash is practically carried out on the commercial scale in Germany:—75lbs. of crude potash are introduced into a pear-shaped cast-iron pot, placed somewhat aslant, and heated above the melting

point in a reverberatory furnace; 65lbs. of charcoal, from blood, horns, hoofs, parings of skins or leather, are then added, together with 2lbs. of iron filings on smithy scales. These additions are made gradually, first in small, and afterwards in larger quantities. Violent intumescence takes place, especially at first, from escape of carbonic acid and combustible gases, and vapours which are inflammable. The above-named animal substances may also be used in the uncharred state; but they produce more gas and vapour, and therefore cool the carbonate of potash more quickly. The ignition is continued until the mass is brought to a state of quiet fusion and gives off white fumes, after which it is taken out. The fused mass thus obtained amounts to from 95 to 98lbs., and yields 18 to 22lbs. of crystallized prussiate of potash. To obtain the crystallized salt, the fused mass, after cooling, is digested in moderately warm water and stirred, until the solution attains sp. gr. 1.148. It is then left to subside, after which it is decanted, and the undissolved residue twice treated with water in a similar manner; the last time, however, at a boiling heat. It is usual to add acetate of iron to the fused mass and water, till the evolution of ammonia diminishes, because the cyanide of potassium not yet combined with cyanide of iron, is thereby converted into ferrocyanide of potassium and acetate of potash. The undissolved residue is again washed with water, and the weak solution thus obtained is used to dissolve fresh portions of the fused mass. The mixture of the three solutions obtained as above is completely clarified by subsidence and decantation, evaporated at 95° to a sp. gr. not exceeding 1.27, then run off into the crystallizing vessel. After some days the mother-liquor is separated from the crystals then formed, evaporated to sp. gr. 1.49, and stirred till cold. The mother-liquor from the last formed crystals is evaporated and used instead of potash for the next fusion. The first and second crops of crystals are purified by re-crystallization.

Apparatus for the Manufacture of Yellow Prussiate of Potash.—The form and nature of the pot are by no means matters of indifference. The form should be such as to prevent the access of air as much as possible without causing unnecessary labour to the workman in the charging and emptying of the pot; and in consequence of the high temperature employed, the cast iron should be of the kind called "cold-blast iron," for this will resist the application of a much higher heat than hot-blast iron. The old shape of a prussiate of potash pot is almost exactly that of an egg, with its upper part cut off; and this, in an economical point of view, is scarcely susceptible of improvement; but the pasty mass, after each operation, can be removed from this pot with great difficulty only, and the mixing or stirring is still more open to objection. Many manufacturers, however, still continue to employ this form of pot. More recently a kind of oblong shallow trough has come into use, which presents every facility for charging and discharging; but the waste of nitrogen is said to be considerable, and the wear and tear excessive; so that a middle shape, or combination of the two, would appear to be most suitable. Common gas retorts have been employed in the manufacture of prussiate with the most unqualified success. In these, the action of the air is entirely prevented, and the stirring process goes on through an opening in the door, which being provided with a plug or stopper, permits the occasional condensation of much of the waste ammonia to take place; or, by the use of what are called "reciprocating retorts," enables the manufacturer to pass the volatile matters arising from a recent charge, over the incandescent materials of an old or spent charge, so as to convert the ammonia they contain into cyanogen.

Mr. Watson, of Leeds, manufacturer of prussiate of potash, has patented improvements in the apparatus used in the manufacturing this salt. "My improvements," says Mr. Watson, "in apparatus for the manufacturing of prussiate of potash consist in so arranging and combining apparatus with the iron pots or vessels, in which animal matter is combined with fused potash for the manufacturing of prussiate of potash, that such pots may be more readily emptied than by the ordinary method; such combination of apparatus also affording increased facilities of introducing the materials into such pots, and confining the gases evolved so as to prevent them becoming a nuisance, or partly condensing such gases, and obtaining useful products therefrom. In the ordinary method of making prussiate of potash, the iron pot in which the fused potash and animal matter is combined is covered with a moveable lid, and the potash and animal matter kept in motion by an agitator until the combination is supposed to be complete, when the lid is removed, the agitator withdrawn, and the incandescent materials are taken out by means of a ladle. Now, in-

stead of employing such pots in such manner, I propose to employ them by pressure, either by confining gases which may be generated in such pots, so as to force or press the semi-fluid contents up through a tube immersed therein into an open vessel or other convenient receptacle ; or I propose to connect a vessel with such immersed tube, and by forming a vacuum in such vessel to force or draw the incandescent and semi-fluid contents of the pot into such vessel, thereby in either case rendering it unnecessary to remove the lid or withdraw the agitator, and so affording facilities for connecting with the pots suitable apparatus and machinery for supplying the animal matter to them, and attaching to them pipes to confine or conduct any gases evolved during the process, and applying some of them to useful purposes."

At a subsequent date Mr. Watson *provisionally* specified the following " improvements in apparatus for manufacturing prussiate of potash," but did not proceed to complete the patent for the same. He says—" My improvements in apparatus for the manufacture of prussiate of potash consist in so constructing, arranging, and combining apparatus with the iron pots or vessels in which animal matter is combined with fused potash for the manufacture of prussiate of potash, that such animal matter may be introduced into such pots or vessels through a tube or passage descending into and communicating with the lower part of such pot or vessel ; and in connecting with such pots or vessels another and smaller vessel in such manner as to be heated by the same fire for the purpose of fusing the potash previous to introducing it into the pots, and having such smaller vessel so connected with the larger vessel that the fused potash can be conveniently admitted from the smaller into the larger vessel, or such smaller vessel so placed in connexion with the larger vessel that it may be heated by the same fire, and moveable in such manner that the fused potash may be transferred out of it into the larger vessel ; and in connecting a pipe or tube with the pots in which the animal matter and potash are mixed to convey the gases evolved during the operation into suitable condensing and other apparatus by means of exhausting apparatus, with valves so constructed that when the gases cease to be evolved the communication will be shut off between the vessels and exhausting apparatus."

Application of the Nitrogen of the Atmosphere to the Manufacture of Prussiate of Potash.—A great waste invariably occurs in the manufacture of prussiate of potash from animal matters, and fully two-thirds of all the nitrogen existing in the azotised ingredients of the process are driven off and lost. More frequently, indeed, the loss amounts to three-fourths, and even this is sometimes exceeded. The state of the weather, and the temperature of the furnace also largely affect the production of prussiate of potash, for damp, foggy weather, and a low, dull heat are extremely prejudicial. The most favourable indications are, a heat verging on whiteness, and the production of a clear bright flame the moment the materials are thrown into the pot.

Some years ago, the Society of Arts presented their gold medal to Mr. Lewis Thompson for his discovery of the manufacture of prussiate of potash by means of the nitrogen of the air, and several patents have since been taken out for improvements in the apparatus needed to render this discovery available. The fact that atmospheric nitrogen can be brought into chemical union is thoroughly established by this discovery, which should therefore stimulate inventors to further efforts for utilizing this great storehouse of azote. If nitrogen can be made to unite with carbon, why should it not be made to combine with hydrogen, and thus produce ammonia. Twenty-five years ago, the one of these combinations was apparently as improbable as the other.

The process of manufacturing prussiate of potash by means of the nitrogen of the atmosphere, was tried by Messrs. Bramwell, of Newcastle-upon-Tyne, one of the largest makers of prussiate in the United Kingdom, and is thus described by Mr. Hughes, of Borrow Stoness :—

JURORS' REPORT OF GREAT EXHIBITION.

"In 1844 we commenced a series of experiments upon the large scale, at Newcastle, in company with Messrs. Bramwell, to manufacture prussiate of potash without animal matter, substituting the nitrogen of the atmosphere for it, and continuing the experiments till the latter end of 1847.

"In these operations a tube or retort of fire-clay was placed in a vertical position

in a furnace so constructed, that when the formation of carbonic oxide was prevented, sufficient heat could be obtained to soften a Stourbridge fire-brick throughout its substance, when exposed in the flue or off-go to the full force of the fire.

"The lower part of the retort was made of cast-iron, kept out of the vicinity of the fire, and of sufficient length to afford time for the mass heated by the fire to become cool, before it was discharged into a cistern placed below containing water and a protosalt of iron, into which the lower end of the tube dipped. Provision was made at this end of the tube to regulate the periodical discharge of its contents in whatever proportion was desired.

"The tube was filled with wood charcoal, saturated with a solution of the carbonate of potash of commerce and dried. The mixture in this state generally contained about twenty per cent. of potassa (KO).

"By means of an air-pump, the atmospheric air was drawn through the tube of alkalized charcoal in a continuous stream from the top, and discharged below in the state of nitrogen and carbonic oxide.

"The alkalized charcoal was thus found to become pretty rich in cyanide of potassium; one-half of the alkali of the cyanized charcoal frequently being found, upon testing, to be in combination with cyanogen, so that when all was working well, 36 to 40 cwt. of prussiate of potash were produced in a week by means of seven to eight retorts, of ten to twelve feet long in the fire, and two feet internal diameter.

"In our first experiments much narrower tubes were employed, to which the heat was applied only externally, but as both the tubes and charcoal are bad conductors of heat, we could not operate upon sufficient quantities, and we found it necessary to build larger tubes, with fire-bricks of the above dimensions, leaving a circle of small apertures or chinks in the tube, every third or fourth tier of bricks, through which the intensely heated gases nitrogen and carbonic acid were drawn from the flue surrounding the tubes, by the action of an aspirator. We thus had the mass in the interior of the large tubes so hot, that an iron rod one inch in diameter became white hot when thrust down in the centre, and allowed to remain there five or ten minutes.

"Our next improvement was to use the alkalized charcoal undried, and to aspirate the air from below upwards, instead of downwards, the surplus heat drying the alkalized charcoal before it reached that part of the retort in which the cyanide was produced, a length of six to eight feet. The top of the retort was in this case rendered air-tight, and the cyanized mass discharged below as before.

"Through seven or eight retorts of the above size, about 2400 cubic feet of alkalized charcoal were passed in a week, and about 1200 to 1400 cubic feet of cyanized charcoal were obtained, nearly one-half of the charcoal being consumed.

"There were two great drawbacks to this process; one, the immense quantity of material to be lixiviated for a small return of prussiate; the other, and by far the more important, an extraordinary waste of potash in the process, upwards of three parts by weight being consumed in producing one of prussiate. The whole of this waste could never be properly accounted for. About one part was, of course, recovered in a state of prussiate. It was found that another was lost in the small refuse charcoal, which could not be lixiviated to pay, and the remainder appeared to be partly combined with the bricks of the retort, and partly dissipated up the chimney.

"In 1847 we abandoned the experiment, after a loss of many thousand pounds. But we proved the possibility of producing large quantities of cyanide of potassium, by drawing intensely heated nitrogen and carbonic acid gases through a mixture of potash and charcoal, with the difficulty of carrying this out as a manufacturing process, from the great waste of potash.

"Our experiments were more directed to making the air process practicable for the purpose of manufacture, than to ascertain upon what principle the formation of cyanogen depended, for it was immaterial, in a manufacturing point of view, whether the cyanogen were produced from the nitrogen of the atmosphere, or from the ammonia which the charcoal was always found to contain. The means of nicely observing the changes were lost from the necessity which existed in operating upon large masses, to draw the intensely heated gases from the fire into the body of the tubes, in order to bring the alkalized charcoal to a proper heat for the production of cyanide of potassium. It is probable that some part at least of the cyanogen was furnished from the ammonia in the charcoal, which in separate

experiments in the laboratory, was found not to be entirely given off at a red heat. Some alkalized charcoal, also brought to a proper heat in a porcelain tube, produced a considerable quantity of cyanide of potassium without the presence of air, the ends being stopped up. On the other hand, when the retorts were filled with charcoal *not alkalized*, and the heated gases drawn through, no formation of either cyanogen or hydrocyanide of ammonia could be detected.

"A paper by Professor Marchand, contained in the eighth volume of the *Chemical Gazette*, page 301, on the presence of nitrogen in cast iron aud steel, appears to throw some light upon the subject. He has shown that when carbon is combined chemically with iron, and treated with potassium in the presence of nitrogen, cyanogen is produced. It seems to me, therefore, probable that the first step in our process was the formation of a carburet of potassium, which, by combining with the aspirated nitrogen, produced the cyanide of potassium. This might be ascertained by examining the remainder left in the retort after the production of potassium in the ordinary way from bitartrate of potash, testing the quantity of cyanide it contained, if any, and then testing the increased quantity after heating it in nitrogen gas.

"I have only further to mention that we substituted soda for potash in the process, with the like loss."

Mr. Bramwell also considers that the process succeeded perfectly in a chemical point of view, although it did not answer as a commercial speculation, and ascribes its failure in economy chiefly to the circumstance that the fire-clay tube could not be made to resist long the combined action of the alkali, and of the excessive heat applied.

The following process for obtaining prussiates was patented Jan. 21, 1840, in the name of Miles Berry, patent agent :—Instead of collecting the sub-carbonate of ammonia, in or by an absorbent medium, it is made to pass through a quantity of charcoal, iron, and potash, placed in an iron tube, kept at a red heat. The carbon, on the one part, decomposes the sub-carbonate of ammonia, and creates bicarburetted hydrogen ; and at the same time gives up part of it to the nitrogen, which proceeds from the decomposed ammonia, and thereby forms cyanogen, which in its turn, combining with the reduced potash, forms prussiate of potash. To obtain the most complete reaction, the operator must divide or reduce the ingredients constituting the decomposing compounds. In order to effect such a division, either of the following means may be used, according to circumstances :—*First Method*—Reduce the charcoal into fragments of about the size of a nut or walnut, then dissolve the potash or salts of potash, such as carbonate or nitrate, in an aqueous solvent ; in urine, for example, if a great quantity can be obtained easily, and at little cost ; otherwise, use common water. With respect to iron, it is to be rendered soluble by the addition of an acid, such as nitric or acetic acid. These preliminary preparations being made, the solution of potash and nitre is then to be poured on the charcoal (the saline lye is very soon absorbed) ; then pour in the solution of iron, stir the mixture with a spatula, evaporate the water which has been used as a solvent, taking care that the compound does not become calcined during the operation. The compound being dry, is again pulverized and introduced into cast-iron tubes, as will be hereafter mentioned. The other method is the substitution of a mechanical division for a chemical one. To effect this, introduce the potash, nitre, and charcoal into a barrel with iron filings, and place in the barrel cannon balls ; then cause the barrel to revolve on its axis, and the balls will grind the compound, and reduce it to small fragments, which will then be mixed together. The compound is then removed from the barrel, and introduced at once into cast-iron pipes, or kept for use in a dry place. The following proportions have been found to give satisfactory results :—When the dry process is employed with the mechanical division, take of ordinary potash 20 parts, saltpetre 10, iron filings 20, coke or ordinary charcoal 45 to 55, dried blood 50 parts, and proceed as above stated. For the wet process, or chemical division, take of ordinary potash 30 parts, saltpetre 10, acetate or nitrate of iron 15, coke or ordinary charcoal 45 to 55, dried blood 50 parts, and proceed as described. Whether the wet or dry process be preferred for obtaining or effecting the mixture, the compound ingredients must be introduced, when perfectly dry, into a series of pipes, connected together and contained in a furnace, similar to that used for the manufacturing of coal gas. Instead of placing the pipes in a horizontal position, which renders it difficult to introduce and draw out, or remove the charge, they may be placed vertically, but then the heating is more expensive. If the tubes

are placed vertically, care must be taken not to pulverize completely the dry compound, in order that the gases may be able to circulate through them without raising the internal pressure to a dangerous pitch. The animal matter is placed in a separate compartment, and in a cast-iron retort, which is connected with the horizontal or vertical pipes. On this retort is placed a safety-valve, to prevent accidents which might arise from any obstacle obstructing the circulation of the gases through the pipes.

Manufacture of Prussiate from Guano.—Dr. Wilton Turner has proposed two or three methods of obtaining prussiates with the use of guano. The following is his mode of adapting the usual process of making prussiate when horn is employed to the manufacture of this salt with guano :—If, without any preparation of the potash or guano, the latter be used in the same manner as dried blood or any of the matters generally employed, no prussiate will be obtained until enough guano has been burnt away for the residuum to form the excess of carbon required for the purpose, and at the same time the ammonia evolved is stifling. But, by mixing carbonaceous matters with the guano, and charging the potash with free carbon, the whole of the nitrogen may be converted into cyanogen, instead of escaping as ammonia. The carbonaceous matter preferred for mixing with the guano is coal tar or pitch, and a clean coal : the employment of tar is very advantageous, for besides furnishing carbon, it binds together the dry powder of the guano ; and thus not only prevents the dry powder from being thrown out of the pot by the rapid combustion, but, from its tenacious qualities, holds in the ammonia until decomposed by the fused potash. Various mixtures of the materials may be made ; but the following formula has been found advantageous :—Bring 42lbs. of good Montreal ashes to a perfect fusion, by a strong red heat ; add a mixture of 7lbs. of coal and 3½lbs. of hæmatite, finely powdered, in small portions at a time ; and, after it is well worked in, allow the pot to " gather its heat again," then work in a mixture of 7lbs. of perfectly dry guano, 7lbs. of coal, and 3½lbs. of tan, and finish by working in 21lbs. of guano with 10 or 11lbs. of tan. The ball of metal, or compound of cyanogen, produced by this operation, is as rich as one made from 42lbs. of potash and 84lbs. of horn, and should now be treated in the usual manner for obtaining the prussiate of potash therefrom. If soda had been used instead of potash, the compound of cyanogen obtained would be prussiate of soda.

Another method is that of obtaining salts of ammonia and prussiate of potash by one and the same process from guano. For this purpose the guano is submitted to destructive distillation and the vapours condensed in a Woulfe's apparatus. The ammoniacal solution, which also contains hydrocyanic acid, is removed from the apparatus, and a solution of protomuriate of iron is added to it, in such quantities as will yield sufficient iron to convert the latter into Prussian blue, which is formed on the addition of muriatic acid in sufficient quantity to neutralize the free ammonia. The precipitate thus formed is now allowed to subside, and is carefully separated from the solution ; and, by being boiled with a solution of potash or soda, will yield the ferrocyanate of the alkali, which is obtained by crystallizing as usual. The solution (after the removal of the precipitate) should be freed from any excess of iron it may contain, by the careful addition of a fresh portion of the ammoniacal liquor, by which the oxide of iron will be precipitated, and a neutral solution of ammonia obtained. When the precipitated oxide and cyanide of iron have subsided, the solution of muriate of ammonia is drawn off by a syphon, and the sal-ammoniac obtained from it by the usual processes; the oxide of iron is added to the ammoniacal solution next operated upon. If sulphate of iron and sulphuric acid had been used, sulphate of ammonia would be the salt produced ; but the chemical changes and operations would be similar to the above.

Mr. John Swindell's improvements in the manufacture of cyanogen compounds are as follows :—Instead of horn and hoof, and other animal matters commonly employed for this purpose, he grinds to a fine powder common coal, cannel coke, or charcoal, or other carbonaceous matter, and mixes therewith a solution of gelatine or albumen, or both combined ; and after thoroughly drying the compound, he uses it in the same way as the horn and hoof is used. Another method of producing the compounds of nitrogen, viz., cyanogen or prussiates and ammonia, consists in combining nitrogen gas or the oxides of nitrogen with carbon, as follows :—When nitrogen is to be used, it may be obtained by passing atmospheric air or any of its compounds or mixtures through heated carbonaceous matter. In order to accele-

rate the process, the mixed nitrogen and carbonic acid is forced through lime, either in a semi-fluid or hydrated state ; or it may be passed through an alkaline solution or through alkaline earth, which will take up the whole of the carbonic acid and any aqueous vapour that may be present, leaving the nitrogen gas moderately free from other gases. The nitrogen gas is then passed through charcoal, previously saturated with potash or soda, kept to a full red heat in a close retort, until the required quantity of cyanide is produced. If ammonia is required to be obtained, nitrogen gas is passed, together with one-fourth its volume of steam, through charcoal kept to a red heat. The ammonia so produced is condensed by the usual process; or atmospheric air may be used and passed with steam through carbonaceous substances kept to a red heat, either in open or close vessels.

When the protoxide, deutoxide, or nitrous vapour is employed for producing cyanogen, the same process may be used as that described in operating with nitrogen gas. In forming ammonia or its compounds from the oxides of nitrogen or nitrous vapour, they are passed with their own volume of steam through charcoal at a red heat, either in close or open vessels ; but if cyanogen is to be produced, the apparatus containing the charcoal must be air-tight, in order to exclude oxygen, carbonic acid, or aqueous vapour.

Mr. Swindell's method of manufacturing prussiates conjointly with carbonate of potash and soda-ash is as follows :—Take any quantity of sulphate of potash or sulphate of soda, and fuse them in a reverberatory furnace, such as is commonly used in the manufacture of alkalies, and then add by degrees a mixture of small caking coal and iron filings, in the proportion of one-part of filings to eight of coal, until to the fused sulphate there has been added one-half its weight of coal or more if the sulphate requires it, taking care to stir the materials well during the addition of the coal and iron filings, and also for ten or fifteen minutes after the whole of the coal is added, when the material will be ready to remove from the furnace and allowed to cool. The same results are also obtained by mixing in the first instance the coal and iron filings with the various sulphates, and then fusing them in the furnace in the usual way, or the iron filings may be omitted in the process, but their addition is to be preferred. Take the materials after being cooled, dissolve in water, and when the solution has settled evaporate it until it has obtained a specific gravity of 1.320 at a boiling heat, then transfer it into coolers, when the prussiate of potash or prussiate of soda crystallizes in the course of four or five days. The solution will now consist of carbonate of potash or soda, and sulphuret of potassium or sodium, which may be removed by the usual methods employed for that purpose. The crystals of prussiate of potash or prussiate of soda will require to be re-dissolved and re-crystallized, when they will be ready for use.

Mr. John Chisholm has also patented a method of distilling organic substances so as to obtain therefrom cyanogen compounds and ammonia. To effect this, he distils animal and vegetable bodies mixed with salts of lime, potash, or soda, in close vessels, such as the retorts used in the manufacture of gas, or in a furnace so constructed that a stream of atmospheric air highly heated and deprived of its oxygen, is made to pass through one or more chambers charged with organic bodies, such as fish or animal offal, or he places organic bodies mixed with any of the requisite alkaline substances above mentioned, in a retort, and passes through it steam at so high a temperature, that it will decompose and carbonize the organic bodies. For example : Take 100lbs. of blood, and mix with it 5lbs. of pearlash, and evaporate to dryness in an iron vessel ; the dry mass is then to be placed in a retort and submitted to destructive distillation ; in connexion with the retort an apparatus is to be attached, similar to that now in use for the manufacture of coal gas. The gases escaping from the retort will be made to pass through purifiers charged with any of the well-known chemicals in use for arresting ammonia, such as chloride of calcium, sulphate of lime, or solutions of sulphuric or hydrochloric acid, or finely ground bones mixed with half their weight of sulphuric acid. During the distillation, nitrogen and hydrogen will be given off, forming ammonia, and in its passage through the purifying vessel such ammonia will be arrested and fixed. The gas, after being deprived of its ammonia, will possess considerable heating and illuminating power, and may be conducted to and burned in the furnaces, or received in a gas-holder for the purpose of light. One fire will do for five retorts, and each charge will take about four hours in working off. The carbonaceous mass must be removed from the retort into a vessel, and excluded from the air until cold. The retorts, while hot, are again charged with another

batch of blood and potash, the operation being made a continuous one. The mass that has been removed from the retorts is to be placed when cold in an iron pan, and mixed with water, and brought near the boiling point, stirring the mass well, so as to dissolve out of it all the soluble salts. It is then to be placed upon a filter, the carbon being well washed with the water, so as to obtain all the salt from it. The solution is now to be treated in the usual way, so as to obtain crystallized ferrocyanide of potassium.

(*To be continued.*)

PRODUCTION OF SAFFRON IN KASHMERE.

Pampur, a large village on the right bank [of the river Jhelum], is celebrated for its saffron grounds. The cultivation of this flower is carried on in nearly every part of this *pergunnah*, the local soil being alone found suited for the purpose. It appeared to consist of a light ferruginous clay, which is excavated near the Jhelum, and carried to the fields by great manual labour. The bulbs are planted out in small square beds in June, weeded and freely irrigated, and the crop is collected in October. The Maharajah and his myrmidons attend the gathering and take the *spolia opima* of the occasion. The drug is sold in the royal bazaar, and I was informed that one rupee *per seer* was levied as export duty on the trader. It varies in price according to quality. I observed some as low as five rupees the *seer* of two pounds, but this was mixed with very ancient stuff, or what was often worse, with the dried *petals* of the flower. True saffron (under royal warranty) fetches from seven to ten rupees *per seer*, *i. e.*, in Kashmeree coinage,—which is little more than half the East Indian Company's. Steeping the article in water previous to weighing out is commonly practised, which, in addition to increasing weight, injures its colouring properties irretrievably.

Sometimes the unwary Hindustanee merchant packs it in the damp state, and, on reaching the plains, discovers to his great sorrow that the precious purchase has become a mass of mouldy rubbish, unsaleable at a *pice*. This happened under my own observation.—*Lieut. W. H. Lowther "On the Natural Productions of the Vale of Kashmere." Journal of the Agricultural and Horticultural Society of India*, vol. viii., part 5 (1854).

ON SODIUM AND ITS MANUFACTURE.

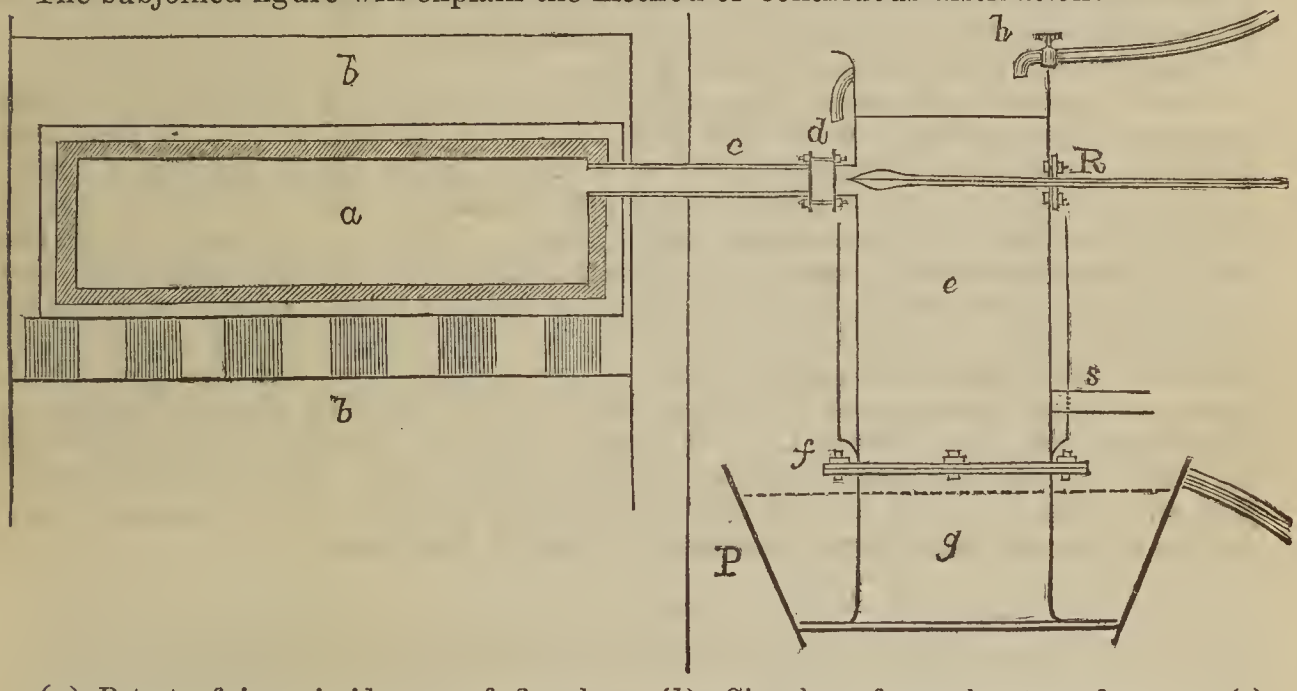
BY WILLIAM BEATSON.

Having for some years given considerable attention to the production of the alkaline metals, I have succeeded in obtaining them (particularly sodium) in such quantites, as to show that it only needed the demand to be created, and they could be supplied in such a way, as would greatly promote the application and extension of science and the chemical arts, and it was only because that demand did not appear to exist, that the subject was allowed to remain in comparative abeyance. Now that such interest has been excited in the enlarged application of Mr. Wöhler's process, for preparing aluminium by means of sodium, chiefly through the exertions of M. St. Clair Deville, it may not be uninteresting to indicate the means by which this latter metal, sodium, may be extracted by enlarged and improved processes, which I have been led to employ for some time past.

The retorts, in which the mixture of carb. soda and coke has been heated, have been chiefly of malleable iron ; but, as it is difficult to obtain these of a large size, retorts of earthenware or fire-clay have been used with success, and probably a fire-clay retort, with a lining or trough of malleable iron, will be found to be the best form of distilling apparatus, though with great care cast-iron retorts may yet be employed with advantage. The principal improvement which I have effected, and which is now engaging the attention of M. Deville, consists in making the process continuous; so that the retort is maintained at nearly a uniform temperature, and only requires the introduction of a fresh charge when the previous one has been worked off. If the materials are properly proportioned, the retort becomes nearly empty at the termination of each distillation ; or, if an excess of carbon remains in the retort it is available in the following operation, so that in this way one retort has been kept in full action for a week, and sometimes for nearly a second week, without interruption. As soon as one distillation is completed and the condenser

removed, a fresh charge of soda and carbon is introduced into the retort, through the same tube as emits the sodium, by means of a long semi-circular scoop, and the retort being nearly filled, the new distillation commences in a short time, and proceeds with the greatest regularity and success ; the sodium which I have sent to the Paris Exhibition was prepared in this way, and, as before stated, it was only because there seemed to be no demand for the metal, that it was not prepared on an industrial and extensive scale ; perhaps, as in some other instances, the supply may create or excite the demand. In addition to the sodium, it is well known that a large quantity of croconates and other compounds of soda distil over and are found mixed with the sodium, and as their separation is tedious in small quantities, I have constructed a large iron cylinder, in which the sodium and its impure admixtures are heated to fusion below the surface of naphtha or camphine, and a piston or plunger being then forced down by a powerful screw or hydraulic press, the pure metal is found in a mass above, and the impurities in the bottom of the cylinder.

The subjoined figure will explain the method of continuous distillation:—



(*a*) Retort of iron, inside one of fire-clay. (*b*) Chamber of reverberatory furnace. (*c*) Eduction tube, attached by screws at (*d*) to the iron-plate receiver (*e*), which is made in two parts, screwed together, and cemented at (*f*), the lower part (*g*), containing naphtha or camphine. (*h*) Tap supplying cold water, which by means of an external case circulates round the condenser (*e*), falling into the pan (*P*). (*R*) is a strong iron rod, with sharpened steel chisel at the end, for clearing out the eduction tube (*c*). (*s*) Escape tube for incondensible gases.

Rotherham, August 14, 1855. *The Chemist.*

ON THE PURIFICATION OF ANTIMONY.

BY M. J. LEFORT.

All chemists who have had occasion to use metallic antimony know how difficult it is to purify it for pharmaceutical purposes, of the last portions of iron, of lead, and above all, of arsenic, which it always contains. To these impurities I may add bismuth, which I have found in some quantity in two samples met with in commerce, the origin of which I was unable to trace.

The severe criticisms which have been published on the processes hitherto indicated for getting antimony in a state of absolute purity, tend to show that this operation, although simple in appearance, is really attended with some difficulty.

Among the different processes for the purification of antimony, there are two, which, being recommended on the authority of Wöhler and Liebig, claim the especial attention of pharmaceutists.

Wöhler's process is based on the transformation of the metals into acids by means of nitrate of potash. There are thus produced insoluble antimoniate of potash, and soluble arseniate of potash.

Berzelius, who tried this process, found that it did not always yield a product free from arsenic, for the resulting antimony heated in the blowpipe flame with charcoal generally affords a slight alliaceous smell.

Liebig's process, to which some authors give the preference, is as follows :—

Sixteen parts of metallic antimony are mixed with one part of sulphuret of antimony and two parts of dry carbonate of soda, and the mixture fused in a Hessian crucible. The button of metal which results is powdered, then fused with one-and-a-half part of carbonate of soda, and the product of this operation is again powdered and fused a third time with one part of carbonate of soda.

I have found that this process, which in practice is rather tedious, does not answer well if the antimony contains much of the foreign metals. It is also subject to the objection that it is not economical, as during the three successive fusions, much of the antimony is lost in the scoria which is rejected. Moreover, Mosander, Berzelius, Berlin, Bucholz, and Trommsdorff assert that they have always found arsenic, even after fusing the metal many times with carbonate of soda.

I have endeavoured to ascertain whether a more satisfactory result may not be obtained by substituting a wet process for the dry process. In fact, I have found that, by converting the antimony into antimonic acid by means of nitric acid, it is possible not only to dissolve all the arsenic in the state of arsenious acid, but also to convert the lead, bismuth, and iron, into soluble nitrates.

The following is the process I adopt :—

Into a porcelain capsule of large capacity placed under a chimney, I put 500 grammes of commercial nitric acid, and add, in small quantities at a time, 250 grammes of metallic antimony reduced to a fine powder. Each addition of metal causes the disengagement of abundance of nitrous fumes. All the antimony passes to the state of insoluble antimoniate of antimony, which is quite white, while the foreign matters remain in solution in the supernatant liquor. The product of this operation is thrown into a large precipitating vessel and washed several times by decantation, with water containing one per cent. of nitric acid. After eight or ten successive washings, the deposit is drained as much as possible, and then mixed with thirty or forty grammes of powdered sugar. The resulting paste is put into a Hessian crucible, and calcined at a red heat. After the mass has cooled, there will be found beneath the scoria a button of metal, which, when tested with the blow-pipe and with reagents, will not afford evidence of the presence of a trace of any foreign metal, and especially of arsenic.—*Journal de Pharmacie.*

ON THE SOLUBILITY OF CARBONATE OF SODA.

BY M. HENRI LŒWEL.

In some remarks on M. Payen's article "On the Solubility of Carbonate of Soda," which appeared in vol. xliii. of the *Annales de Chimie*, the following passage occurs:—

"M. Payen, in reviewing the statements relative to the solubility of the carbonate of soda, is of opinion that the point of maximum solubility is at 38° Centigrade, instead of 34°, as stated by M. Lœwel ; 100 parts of water dissolving 1700 parts of crystallizable carbonate of soda at 38°, while 100 parts of water only dissolve 548 parts at 34°."

I must here correct a numerical fault which I find I committed in my previous article. The solution of carbonate of soda, saturated at a temperature of 38°, contains in 100 parts, 51.67 of anhydrous salt, a quantity equal to 1142.17 of crystallized salt—Na O, CO_2 + 10 HO, and not 1700 as I originally stated. I did not give the amount of crystallized salt contained in a solution saturated at 34°, but I said, that the solution saturated at 104° contains less soda than a solution saturated at 38°, and it is therefore probable that at 34° (the point at which the crystals dissolve in their water of crystallization) the solution contains the largest amount of this salt.

The number 548, as representing the amount of crystallized salt in 100 parts of water, at 34° was not given by me, and is decidedly wrong.

With regard to the maximum solubility, I take the liberty to lay the following observations before M. Payen :—By boiling for some time a solution of carbonate of soda, saturated at 104°, it deposits, slowly and in proportion to its concentration, crystals of a monohydrated salt. By allowing the solution to cool in a closed flask, and occasionally shaking it, it slowly re-dissolves a portion of the crystals deposited at its boiling point. The monolydrated salt is, therefore, more soluble at 38° than

at 104°, although its maximum solubility is, as I thought, neither at 38° nor 34° ; the solution dissolving more of the monolydrate below this temperature.

Upon repeating the experiment, and cooling the solution down to between 15° and 20°, I found 100 parts contained 52.41 of anhydrous carbonate of soda, equivalent to 1290 of crystallized carbonate. A solution saturated between 17° and 18° contained, therefore, more salt in solution than one saturated at 38°. Unfortunately, it is impossible to ascertain if the solubility of the monohydrated salt increases as the temperature decreases ; for when exposed to a temperature below 15°, the solution suddenly becomes opaque, its molecular constitution changes, and it deposits crystals which sometimes contain ten atoms of water, and sometimes seven atoms. The latter seems to exist in two different states of molecular constitution, one form being much more soluble than the other, although possessing the same chemical composition. I shall distinguish these as Na O, CO_2 + 7 HOa, and Na O, CO_2 + 7 HOb.

The solubility of these three varieties now increases with the temperature up to 34°, at which point, however, they again form the monohydrated carbonate, the solubility of which increases with the decrease of temperature. According to my observations, therefore, carbonate of soda possesses at least four different solubilities depending upon its molecular constitution and its state of hydration.

REMARK ON THE PRECEDING.

BY M. PAYEN.

It appears from the extraordinary observations of M. Lœwel that carbonate of soda can, under different circumstances, possess different maximum solubilities; one which is arrived at by decrease of temperature, the other which is produced by raising the temperature.

The determination of these points is highly interesting, and M. Lœwel deserves great credit for the accuracy and precision with which he has carried it out.

ON NITRO-GLYCERINE OR GLONOÏNE.

BY M. J. E. VRIJ,
Professor of Chemistry at the Medical School of Rotterdam.

In 1847, when Chemists were intent on the production of gun-cotton, M. Sobrero made known the fact that glycerine, when treated with a mixture of sulphuric and nitric acids, yielded a similar compound, which he described as an oily liquid, heavier than water, in which menstruum it was almost insoluble, although readily dissolved by alcohol and ether.

According to this author, the smallest quantity of it was sufficient to produce a most violent headache, from which he concluded it would prove a most dangerous poison.

These observations attracted my attention, and in 1851 I determined to prepare some for examination. My experiments, made on a small scale, succeeded perfectly, and enabled me to corroborate the truth of M. Sobrero's statements. I found, however, that it possessed no poisonous properties, although occasioning intense headache ; for upon administering ten drops to a rabbit, no symptoms of poisoning appeared.

The desire of investigating this subject further induced me to undertake the preparation of a larger quantity of this substance. The attempt, however, deprived me of my eyesight for a considerable time, in consequence of the explosion of the mixture. After my recovery I resumed my inquiries, and prepared a considerable quantity of nitro-glycerine, which enabled me to determine with greater accuracy some of its properties. The result of these experiments I communicated in 1851 to the British Association.

My attention has lately been again directed to this subject by the statement in some foreign journals, that nitro-glycerine is being employed in America as a therapeutic agent under the name of Glonoïne. Besides the interest which attaches itself to this substance in a scientific point of view, therefore, it seems to possess a certain value as a pharmaceutical agent.

This consideration induced me to try and acertain the best mode of preparing this substance, and again reviewing its principal properties.

Preparation.—After repeated experiments I found the following the best mode of preparation :—100 grammes (1543.3 grs.) of glycerine, freed as much as possible from water, and having a sp. gr. 1.262, were cautiously, and in small quantities at a time, added to 200 cubic centim. (18 ounces) of monohydrated nitric acid, previously

immersed in a freezing mixture. The temperature rises upon each addition. It is therefore necessary to allow the mixture to cool down again to—10° C. (14° Fahr.) before any fresh addition is made, as it is very necessary that the temperature should never rise above 0° C. (32° Fahr.). When the glycerine and nitric acid have formed a homogeneous fluid, which may be facilitated by stirring the mixture with a glass rod, 200 cubic centim. (18 ounces) of concentrated sulphuric acid are cautiously and slowly added.

This operation is accompanied with the greatest danger, if the temperature is not continually watched. Experience, however, shows me that there is no reason for fear, provided the temperature be always kept below 0° C. (32° Fahr.).

Once I saw the temperature run up to 10° C. (50° Fahr.) without occasioning an explosion; but between 10° C. and 20° C. a violent reaction suddenly takes place, and the mixture is violently propelled from the vessel. I, however, repeat again that such an accident can be safely avoided by keeping the temperature below 0° C.

When these precautions have been taken the nitro-glycerine separates, after the addition of the sulphuric acid, in the form of an oily liquid floating on the surface, and may be collected by means of a separating funnel.

The product thus obtained, which is still contaminated with a little acid, weighs about 200 grammes (3086.6 grs.). A still further portion, however, about 20 grammes (308.6 grs.), may be obtained from the acid liquor by diluting it with water.

The products thus obtained are then dissolved in a small quantity of ether, and this solution repeatedly shaken with water till all trace of acid is removed. The ethereal solution is then heated over a water-bath till nothing more is volatilized. The resulting quantity will be about 184 grammes (2838.6 grs.). The composition of glycerine being $C_6 H_8 O_6 = 92$, and 100 parts of glycerine yielding 184 of nitro-glycerine, we may infer that the composition of nitro-glycerine is $C_6 H_6 (2\ No4) O_6 = 182$. I am at present endeavouring to ascertain if this inference is correct.

Properties.—Nitro-glycerine is an oleaginous liquid of a clear yellow colour, having a sp. gr. from 1.595 to 1.600 Heated to 160° C. (320° F.), it is decomposed, evolving red vapours; at a higher temperature it either explodes or inflames without any detonation.

It is difficult to determine accurately the point at which explosion takes place; it is best observed by allowing the nitro-glycerine to drop from time to time upon a piece of heated porcelain. At first it burns away with a vivid flame, but as the temperature diminishes, it violently explodes, evolving red vapours, and frequently breaking the porcelain on which it falls.

By placing a drop on an anvil and striking it with a hammer, it instantly detonates. When properly prepared and free from acid, it may be kept for any length of time. I have some in my possession which has been kept for two years without undergoing the slightest change.

Upon the addition of sulphuric acid to the ethereal solution, decomposition ensues, and a great quantity of sulphur is thrown down.

I am engaged in investigating this reaction, which perhaps may throw some light on the constitution of nitro-glycerine.—*Journal Pharmacie d'Anvers* and *Journal de Pharmacie.*

BRITISH ASSOCIATION.

MEETING AT GLASGOW, SEPTEMBER, 1855.

The twenty-fifth Meeting, held at Glasgow, was very numerously attended, and may be considered as one of the most successful of the series.

The officers of the Chemical Section were :—

President—Dr. Lyon Playfair.

Vice-Presidents—Baron Liebig, M. Frémy, M. Peligot, Prof. Anderson, Dr. Andrews, Dr. Daubeny, T. Graham, Dr. W. A. Miller, Dr. R. D. Thomson.

Secretaries—Prof. Frankland, Dr. H. E. Roscoe.

Committee—Dugald Campbell, Prof. Connell, W. Crum, W. De la Rue, J. B. Edwards, Dr. Gilbert, Dr. Gladstone, Dr. Hassall, T. S. Hunt, F. Jennings, Prof. Penny, J. Tennant, J. Tennent, T. Turnbull, Dr. G. Wilson, T. J. Pearsall, Prof. F. C. Calvert, Dr. Macadam, Dr. Matthiessen, Prof. Ronalds, Dr. M'Vicar, Rev. J. Barlow, R. Allan, Dr. Baer, Dr. Hermann, J. Young, G. F. Wilson, S. Highley, H. Bartholomew, J. Napier, J. Meldrum.

At the first meeting of this section, Baron Liebig handed in for inspection a large bar of the new metal, aluminium. After some remarks by the President as to the

source and some of the properties of this metal, Dr. Daubeny laid on the table a set of small analytical weights made from this metal, which he considered peculiarly adapted to this purpose, owing to its great specific lightness. Dr. Playfair mentioned an interesting property of the metal aluminium—its resonance, which was evident to all present.

The following are some of the more important papers read in this section :—

ON THE METALS OF THE ALKALINE EARTHS.

BY DR. MATTHIESSEN.

Dr. Matthiessen has succeeded in preparing the metals strontium and calcium in the form of metallic reguli. The mode of preparation was illustrated by the apparatus used, and beautiful specimens of the metals, sealed up in tubes containing rock oil, and free from all air, were circulated among the members of the section. Specimens of Lithium wire, prepared by Professor Bunsen, at whose laboratory at Heidelberg the foregoing metals were prepared, were also exhibited.

ON THE PHOSPHORESCENCE AND COMPOSITION OF PLATE-SULPHATE OF POTASH.

BY PROFESSOR PENNY.

The subject of this paper is a chemical product from kelp. It is called plate-sulphate of potash from the circumstance of its being crystallized in thick plates or slabs, consisting of the aggregate layers of successive crops of crystals. Beautiful specimens of the salt, supplied by Mr. Paterson, one of the most extensive manufacturers of kelp products in Glasgow, were exhibited to the section. There are several points in the chemical history of this salt, possessing a high degree of scientific interest. The principal points alluded to by the author of the paper, were, first, the peculiarity of the process by which it is obtained in slabs or slates; second, the brilliant phosphorescence of its crystals at the time of their formation ; and, third, its remarkable composition. The mode of obtaining it was fully explained, and the various circumstances that influence the emission of light from the salt at the time of crystallizing, were minutely described.

ON A NEW FORM OF CYANIC ACID.

BY BARON LIEBIG.

In the course of some experiments on the fulminate of mercury, I observed that that compound, when kept boiling in water, changed its colour, and lost its fulminating properties. On examining the change that had taken place in the composition of the fulminate, I discovered a new acid, which had exactly the composition of cyanuric acid, but which differed entirely from that acid in its properties, and in the properties of the salts which are produced with the alkaline bases—salts remarkable for their beauty, and for the distinctness of their crystalline form. Taking for the equivalent of hydrated fulminic acid the formula C_2NO, HO, the new acid is produced in a very similar manner. The elements of three equivalents of fulminic acid unite to form one equivalent of the new acid, to which I shall give the name of fulminuric acid. This acid is monobasic. Its salt of silver is soluble in hot water, and crystallizes from it in long, silky, white needles. The alkaline salts of the new acid are very easily prepared by boiling the fulminate of mercury with an alkaline chloride. The fulminate of mercury is first dissolved, then gradually two-thirds of the oxide of mercury precipitates, and the alkaline fulminate, with a certain quantity of chloride of mercury and potassium, remains in the solution. By employing the chloride of sodium or the chloride of barium, we obtain, of course, a salt of the new acid, with a base of soda or of barytes. With chloride of ammonium an ammoniacal salt is obtained, the crystals of which are distinguished from all others by their adamantine brilliancy, and their high degree of power and lustre. These crystals belong to the Klinerhombic system, and possess double refraction almost as strongly as Iceland spar. The hydrated acid is easily obtained by decomposing the basic lead salt by means of sulphuretted hydrogen. It has a strongly acid reaction, and when reduced by evaporation to a state of syrup, it is transformed by degrees into a crystalline mass, which dissolves in alcohol, and which, by the action of acids, is changed into carbonic acid and ammonia.

ON A PROCESS FOR OBTAINING LITHOGRAPHS BY THE PHOTOGRAPHIC PROCESS.

BY PROFESSOR RAMSEY.

Professor Ramsey described a process by which Mr. Robert M'Pherson, of Rome, had succeeded in obtaining beautiful photo-lithographs, specimens of which had been hung up in the Photographic Exhibition in Buchanan Street. The steps of the process are as follows:—1. Bitumen is dissolved in sulphuric ether, and the solution is poured on an ordinary lithographic stone. The ether quickly evaporates, and leaves a thin coating of bitumen spread uniformly over the stone. This coating is sensitive to light, a discovery made originally by Mr. Niepce, of Chalons. 2. A negative on glass or waxed paper, is applied to the sensitive coating of bitumen, and exposed to the full rays of the sun for a period longer or shorter, according to the intensity of the light, and a faint impression on the bitumen is thus obtained. 3. The stone is now placed in a bath of sulphuric ether, which almost instantaneously dissolves the bitumen, which has not been acted upon by light, leaving a delicate picture on the stone, composed of bitumen on which the light has fallen. 4. The stone after being carefully washed, may be at once placed in the hands of the lithographer, who is to treat it in the ordinary manner with gum and acid, after which proofs may be thrown off by the usual process. Prof. Ramsey then proceeded to state that the above process modified, had been employed with success to etch plates of steel or copper, without the use of the burin:—1. The metal plate is prepared with a coating of bitumen, precisely in the manner noticed above. 2. A positive picture on glass or paper is then applied to the bitumen, and an impression is obtained by exposure to light. 3. The plate is placed in a bath of ether, and the bitumen not acted upon by light is dissolved out. A beautiful negative remains on the plate. 4. The plate is now to be plunged into a galvano-plastic bath, and gilded. The gold adheres to the bare metal but refuses to attach itself to the bitumen. 5. The bitumen is now removed entirely by the action of spirits and gentle heat. The lines of the negative picture are now represented in bare steel or copper, the rest of the plate being covered by a coating of gold. 6. Nitric acid is now applied as in the common etching process. The acid attacks the lines of the picture formed by the bare metal, but will not bite into the gilded surface. A perfect etching is thus obtained.

ON ALLOYS OF IRON AND ALUMINIUM.

BY PROFESSOR CALVERT.

Messrs. Calvert and Johnson, of Manchester, have succeeded in preparing the following alloys of iron and potassium:—1st alloy: four equivalents of iron, 1 ditto of potassium. 2nd alloy: 6 equivalents of iron, 1 ditto of potassium. These alloys were prepared with a view of solving one of the great chemical and commercial questions of the day—namely, that of rendering iron less oxidable when exposed to a damp atmosphere; as these gentlemen believe that no kind of coating can be discovered which will resist the constant friction of water, as is the case with iron steamers. They have also succeeded in producing two new alloys, composed of iron, combined with that most valuable and extraordinary metal, aluminium, lately obtained by M. St.-Claire Deville. These two alloys are composed as follows:—1st. 1 equivalent of aluminium; 5 ditto of iron. 2nd. 2 equivalents of aluminium; 3 ditto of iron. The last alloy presents the useful property of not oxidizing when exposed to a damp atmosphere, although it contains 75 per cent. of iron.

ON THE TITANIFEROUS IRON OF THE MERSEY SHORE.

BY DR. EDWARDS.

Dr. Edwards remarked upon a form of titaniferous iron which occurs on the western shore of the Mersey, and gave his analysis of it, by which it appears to contain 12·30 per cent. of titanic acid, which is its most valuable constituent. It disintegrates from boulders found in the clay drift along the shore of Seacombe, and becomes mixed with the sand, from which it is separated by means of a magnet. It also contains alumina, silica, and magnetic oxide of iron, hence it possesses magnetic properties. The mineral does not belong to the series of rocks of the neighbourhood of Liverpool, but exists in large masses, and has been carried by drift from the hills of Cumberland.

ON THE CHEMISTRY OF THE ADULTERATIONS OF FOOD.

BY DR. HASSALL.

The paper, which was of considerable length, contained an immense number of cases which had come under Dr. Hassall's observation of adulterations of food. These have already been published in the Report of Examinations before a Committee of the House of Commons.

A lengthened discussion followed. One gentleman held that there were only two articles of manufacture which were not adulterated.—Professor Graham and Dr. Maclagan, whilst admitting that there were cases of adulteration, were afraid that too much alarm had been raised on the subject. All adulterations were not necessarily pernicious, and caution should be used not unnecessarily to alarm the public mind.

ON A PROCESS FOR OBTAINING AND PURIFYING GLYCERINE, AND ON SOME OF ITS APPLICATIONS.

BY MR. G. F. WILSON.

The paper I was asked to give was one on our new process of obtaining and of purifying glycerine. I trust, however, you will excuse, as an introduction, a short sketch of the past history of glycerine and its uses, though it will take us over some ground well known to most members present.

Glycerine was discovered in 1789 by Scheele, as a product in the process of lead plaster making, and was called by him the sweet principle of oils. About twenty-five years afterwards it was studied by the father of fatty chemistry, Chevreul, and shown by him to be the base of fats and fat oils. M. Chevreul lately received a specimen of glycerine obtained by our new process, with expressions of extreme pleasure. Nearly half a century has passed since the earliest of those beautiful researches into the constitution of fatty bodies, in the course of which he discovered the function of glycerine, yet our specimen found him still lecturing to his class.

A source of impure glycerine has long existed in the preparation of lead plaster, in which the combination of the litharge with the acids of the olive oil sets the glycerine free; another source in soap-making, the soda or potash setting free the glycerine; and a third source in the stearic candle manufacture, where the lime saponification separates the glycerine. Most of the purifiers of glycerine appear to have preferred this last source.

Notwithstanding the known existence of these great sources of impure glycerine, it was long before glycerine was in any way utilized: hundreds of tons have been and are yearly thrown away.

The first suggestion of a use which we can trace dates in the beginning of 1844, when Mr. Thomas De la Rue, being engaged on some experiments requiring the use of syrupy substances, procured some glycerine from Mr. Warington, of Apothecaries' Hall, some of which he applied to a burn and an irritation of the skin. The experience thus obtained of its properties of soothing and keeping moist, led to its introduction, through Mr. Startin, into the Hospital for Skin Diseases, where it soon came into extensive use.

In 1846 Mr. Warington took out a patent for the use of glycerine as an agent in preserving animal and vegetable substances, and tried many experiments on preserving meat. He informs me that part of a neck of mutton preserved in glycerine for several months, when cooked by Soyer, was partaken of by a gentleman with great satisfaction.

Mr. Warington, I believe, first applied glycerine in mounting objects for the microscope, for which it has proved so successful.

In the *Lancet* of June, 1849, Mr. Thomas Wakley published the results of a year's experience in a long and very interesting paper on the use of glycerine in diseases of the ear, giving a number of cases in which it had proved a cure for deafness. In the number of the 23rd of the same month his results were confirmed by letters from Mr. Erasmus Wilson and Dr. Gardner, the latter of whom drew attention to the fact that glycerine should be free, not only from any trace of lead, but also as much as possible from water. His theory was, however, better than his practice; for the glycerine he speaks of using, sp. gr. 1.280, being above the density of anhydrous glycerine, must have been impure.

Isolated applications of glycerine had thus been suggested; but M. Cap appears to have been the first to see its extraordinary value in a great variety of medicinal preparations. His very valuable and interesting papers were published in the

Journal de Pharmacie et de Chimie, and translated into the *Chemist*. I shall give two short extracts from them.

M. Cap, in his first paper (*Journal de Pharmacie et de Chimie*, February, 1854, *Chemist*, April, 1854), begins by attacking the process of purifying glycerine given in the French chemical books, and shows its defects. He then gives his own process, remarks upon the great value of glycerine in skin diseases, and after suggesting a number of valuable uses, proceeds as follows :—

"Glycerine dissolves the vegetable acids, the deliquescent salts, the sulphates of potassa, soda, and copper, the nitrates of potassa and silver, the alkaline chlorides, potassa, soda, baryta, strontia, bromine, iodine, and even oxide of lead. It dissolves or suspends the vegetable alkaloids in the same manner as the aqueous liquids, and at the same time the resulting products may be used for the same purposes as though mixed with oil. Thus the salts of morphia dissolve in it completely, even cold, in all proportions. Sulphate of quinine, in the proportion of one-tenth, dissolves in it when hot, but when cold separates into clots, which when triturated with the supernatant liquid, give it the consistence of a cerate very useful for frictions and embrocations. It is the same with the salts of brucine, strychnine, veratrine, and most preparations of the same order, which enables us to consider that we have now, if not medicinal oils with a vegetable alkaloid base, at least a series of new preparations which will fulfil a perfectly analogous use in therapeutics."

M. Cap, in his second paper (*Chemist*, Oct. 1854), states that he employed glycerine of 28 Beaumé, or containing 88 per cent. of anhydrous glycerine, and speaks of it as a solvent of sulphuret of potassium, and sulphuret of lime, of iodine, iodide of sulphur, iodide of potassium, iodide of mercury, of some chlorides, and of quinine, and sulphate of quinine.

In the *Chemist* of February, 1855, Dr. Crawcour, of New Orleans, states that for twelve months past he had been in the habit of using glycerine very extensively in those cases requiring cod-liver oil, in which the nauseous taste of the latter medicine rendered its exhibition impossible, and that now, in his practice, it had entirely superseded cod-liver oil.

In a paper read at the meeting of the Royal Institution of 30th of March, 1855, by the Rev. John Barlow, F.R.S., attention was again drawn to the great preservative power of glycerine upon meat. On this occasion Mr. Barlow showed specimens of flesh which had been immersed, some partially and some wholly, in glycerine, for more than a month. I can answer for the flesh having appeared to be perfectly fresh.

M. Cap worked upon the waste liquors of soap and stearic candle works, which liquors he had first to concentrate. His process was shortly this :—He used sulphuric acid to separate the lime, and continued boiling and agitation to drive off the volatile fat acids, removing any excess of sulphuric acid by means of carbonate of lime ; allowing the liquor to cool at different densities, so as to deposit sulphate of lime; and, after final concentration, treating and filtering with washed animal charcoal.

M. Cap's process, though an undoubted improvement, was not perfect, as glycerine so purified is always liable to contain more or less of salts of lime; and some glycerine, purified in our laboratory according to M. Cap's directions, contained in addition volatile fat acids; and though the process was known in this country, specimens of the so-called "pure" glycerine obtained from the best sources in London so recently as last January, contained in every case more or less impurity.

The best specimen came from Edinburgh; but even this was not absolutely free from impurity. Some medical men appear to have been afraid to prescribe glycerine for internal use, sometimes with reason, as appears from the *Chemist* of May, 1855, where Mr. Hamilton, of Liverpool, referring to the papers of MM. Cap and Garot, and of Dr. Crawcour, stated that no doubt the glycerine purified and used by them might be safely used internally; but that having doubts about the purity of the glycerine commonly sold as "pure glycerine," he had procured samples from several of the most respectable Chemists in Liverpool, and on examination had detected lead in considerable quantity, and that the specimen in which he detected the largest quantity of lead was labelled "pure glycerine," was sold at double the price of the common glycerine, and was warranted free from lead.

I will now proceed to describe the new process for obtaining and purifying glycerine, and may remark that the road by which we arrived at pure glycerine was a rather circuitous one. Our first step was to do away with the lime process of saponification, and with it our only source of impure glycerine. By our first im-

provement in separating the fat acids from neutral fats, the glycerine was decomposed by the direct action of concentrated sulphuric acid at a high temperature, and all that remained of it was a charred precipitate. A new process for decomposing neutral fats by water under great pressure coming under our notice, led us to look again more closely into our old distilling processes; and the doing this showed, what we had often been on the brink of discovering, that glycerine might be distilled.

In our new process the only chemical agents employed for decomposing the neutral fat and separating its glycerine, are steam and heat; and the only agents used in purifying the glycerine thus obtained are heat and steam. Thus all trouble from earthy salts or lead is escaped.

Distillation, however, purifies the impure glycerine of the old sources.

On the table is a series of products of palm oil, which will serve to illustrate the process. Steam, at a temperature of from 550° to 600° Fahr., is introduced into a distillatory apparatus, containing a quantity of palm oil. The fatty acids take up their equivalents of water, and the glycerine takes up its equivalent; they then distil over together. In the receiver, the condensed glycerine, from its higher specific gravity, sinks below the fat acids. Sufficient steam must be supplied, and the temperature regulated, otherwise the elements of the glycerine do not take up their equivalent of water, and acroleine is evolved—a body of a very different character, an acrid eye-inflaming vapour, appreciated only by those who have had the misfortune of an experimental acquaintance with it.

In an ordinary apparatus the glycerine distilled from the neutral fat is not in a sufficiently concentrated state for most purposes; it should therefore be concentrated, and, if discoloured, be redistilled. It is then obtained, in the state of the specimen on the table, at the temperature of 60° Fahr.; it is of sp. gr. 1.240, and contains 94 per cent. of anhydrous glycerine. It can be concentrated to sp. gr. 1.260, or to contain 98 per cent.

I have now to mention some uses for glycerine which I believe to be new, or to which I have seen distilled glycerine applied.

A possible use which appears worthy of experiment is to inject it into the bladder for the purpose of dissolving calculous deposits; from its blandness it should not cause irritation, while, as it is a solvent of urea and phosphate of lime, it might dissolve them when in the bladder. Some of the high authorities have received glycerine for the purpose of the experiment.

The use of glycerine in photography having been suggested, some distilled glycerine has been sent to several of the best photographers and makers of photographic preparations. It was very well received, and considered to promise well, and is still the subject of many experiments; but as yet it does not appear that any great results have been arrived at. It is, however, expected to supersede the honey of Shadbolt's process.

The properties of soothing and keeping moist the skin have caused it to be used upon chapped hands and sun-burnt faces. It has been proposed as a substitute for syrup in preserving fruits. Mixed with alcohol or peroxylic spirit, it has been proposed by Mr. Warren De la Rue as an economical fuel for spirit lamps.

For some time past, in Edinburgh as in London, it has been used in skin diseases; it is now being tried in some cases of disease of the mucous membrane of the stomach.

We have been informed that in the preparation of several medicines glycerine may be substituted for syrup or sugar, with the effect not only of preserving the medicine in an active state and free from change, but also of very greatly improving its taste. Griffiths' iron mixture has been mentioned to us as an instance of this.

Glycerine appears to give the means of preservation of some objects of natural history without change in their colour. This is shown by the specimens of fish upon the table. Our first experiment was upon a brilliantly-coloured two pound trout, caught in one of the Perthshire lochs. Immediately on taking it from the water I poured a quantity of glycerine over it, and wrapped it in a cloth. At night the fish was cleaned and immersed in glycerine. Next day it was again wrapped in a saturated cloth. On examining it a day or two afterwards in Edinburgh, the colour on the scales was unchanged. When it arrived in London part was steeped in water and then cooked. Though perfectly fresh and firm, it had lost almost all its flavour; the uncooked portion was immersed in glycerine,

and sent to Professor Owen, who suggested that the brilliantly-tinted fishes of the Coral Islands and tropical coasts might be brought home in kegs of glycerine.

On the table are specimens of trout, roach, and perch, which have been, the trout more than two months, the perch and roach more than one month, in their bottles. It will be seen that the colours continue bright.

I may now state, in conclusion, that though a variety of uses, actual and possible, for pure glycerine have been mentioned, yet when we consider its power as a solvent, and at the same time its blandness, and freedom from all irritant, exciting, acid, and fermenting properties, we must feel that not a tithe of its uses have yet been developed; that in glycerine there is a wide field open, requiring many scientific and practical labourers, and which, once fully worked, will yield a tenfold crop of uses. Pure glycerine will then take its proper place among the most valued of modern products; and, produced, as it will be, in great quantities, it will be recognized in the arts as well as in medicine as a new, real blessing to mankind.

ON THE COMPOSITION OF BREAD.

BY DR. MACLAGAN.

He gave the results of some experiments which he himself had made. The amount of moisture in bread was less, and consequently the nutritive value greater, than was generally allowed. The late Professor Johnston had stated that a sack of flour produced one hundred quartern loaves. But, according to his (Dr. Maclagan's) examination, the sack of 380lb gave 94¼ loaves of bread; 100lb of flour giving 231lb of bread. The majority of bakers were of opinion that the sack produced, on an average, 92 loaves, and there was no great discrepancy between this and the result of his own analysis. Unfermented bread contains of dry flour, 60; moisture, 10; water added by baker, 30. 100lb of flour will give 143lb of bread, and a sack of flour will yield 100½ quartern loaves of unfermented bread.

Baron Liebig made a few observations on a new mode of making bread introduced into Germany. Lime-water had been used in the preparation of the dough, and the loaf was rendered still more nutritive than that made by the common mode.—Dr. Playfair said the Section were much indebted to Dr. Maclagan for his communication. Much discrepancy existed among analytic chemists on the subject; but he believed Dr. Maclagan had arrived at pretty accurate conclusions.

ON PAPYRUS, BONAPARTEA, AND OTHER PLANTS WHICH CAN FURNISH FIBRE FOR PAPER PULP.

BY CHEVALIER DE CLAUSSEN.

The paper-makers are in want of a material to replace rags in the manufacture of paper, and I have therefore turned my attention to this subject, the result of which I will communicate to the Association. To make this matter more comprehensible, I will explain what the paper-makers want. They require a cheap material, with a strong fibre, easily bleached, and of which an unlimited supply may be obtained. I will now enumerate a few of the different substances which I have examined for the purpose of discovering a proper substitute for rags. Rags containing about 50 per cent. of vegetable fibre mixed with wool or silk are regarded by the paper-makers as useless to them, and several thousand tons are yearly burned in the manufacture of prussiate of potash. By a simple process, which consists in boiling these rags in caustic alkali, the animal fibre is dissolved, and the vegetable fibre is available for the manufacture of white paper pulp. Surat, or Jute, the inner bark of *Cochorus indicus*, produces a paper pulp of inferior quality bleached with difficulty. Agave, *Phormium tenax*, and Banana or plantain fibre (Manilla hemp) are not only expensive, but it is nearly impossible to bleach them. The Banana leaves contain forty per cent. of fibre. Flax would be suitable to replace rags in paper manufacture, but the high price and scarcity of it, caused partly by the war, and partly by the injudicious way in which it is cultivated, prevents that. Six tons of flax straw are required to produce one ton of flax fibre, and by the present mode of treatment all the woody part is lost. By my process the bulk of flax straw is lessened by partial clearing before retting, whereby about 50 to 60 per cent. of shoves (a most valuable cattle food) are saved, and the cost of the fibre reduced. By the foregoing it will be seen that the flax plant only produces from 12 to 15 per cent. of paper pulp. All that I have said about flax is applicable to hemp, which produces 25 per cent. of paper

pulp. Nettles produce 25 per cent. of a very beautiful and easily-bleached fibre. Palm-leaves contain 30 to 40 per cent. fibre, but are not easily bleached. The Bromeliacæ contain from 25 to 40 per cent. fibre. *Bonapartea juncoidea* contains 35 per cent. of the most beautiful vegetable fibre known; it could not only be used for paper pulp, but for all kinds of manufactures in which flax, cotton, silk, or wool are employed. It appears that this plant exists in large quantities in Australia, and it is most desirable that some of our large manufacturers should import a quantity of it. The plant wants no other preparation than cutting, drying, and compressing like hay. The bleaching and finishing it may be done here. Ferns give 20 to 25 per cent. fibre, not easily bleached. Equisetum from 15 to 20 per cent. inferior fibre, easily bleached. The inner bark of the lime-tree (Tilia) gives a fibre easily bleached, but not very strong. Althea and many Malvaceæ produce from 15 to 20 per cent. paper pulp. Stalks of beans, peas, hops, buckwheat, potatoes, heather, broom, and many other plants contain from 10 to 20 per cent. of fibre—but their extraction and bleaching present difficulties which will probably prevent their use. The straws of the Cereales cannot be converted into white paper pulp after they have ripened the grain, the joints or knots in the stalks are then so hardened that they will resist all bleaching agents. To produce paper pulp from them they must be cut green before the grain appears, and this would probably not be advantageous. Many grasses contain from 30 to 50 per cent. of fibre, not very strong, but easily bleached. Of indigenous grasses, the Rye grass contains 35 per cent. of paper pulp; the Phalaris 30 per cent., Arrenatherum 30 per cent., Dactylis 30 per cent., and Carex 30 per cent. Several reeds and canes contain from 30 to 50 per cent. of fibre, easily bleached. The stalk of the sugar-cane gives 40 per cent. of white paper pulp. The wood of the Coniferæ gives a fibre suitable for paper pulp. I made this discovery accidentally in 1851, when I was making flax cotton in my model establishment at Stepney, near London. I remarked that the pine-wood vats in which I bleached were rapidly decomposed on the surface into a kind of paper pulp. I collected some, and exhibited it in the Great Exhibition—but as at that time there was no want of paper material, no attention was paid to it. The leaves and top branches of Scotch fir produce 25 per cent. of paper pulp. The shavings and sawdust of wood from Scotch fir gives 40 per cent. pulp. The cost of reducing to pulp and bleaching pine-wood will be about three times that of bleaching rags. As none of the above-named substances or plants would entirely satisfy on all points the wants of the paper-makers, I continued my researches, and at last remembered the papyrus (the plant of which the ancients made their paper), which I examined, and found to contain about 40 per cent. of strong fibre, excellent for paper, and very easily bleached. The only point which was not entirely satisfactory was relative to the abundant supply of it, as this plant is only found in Egypt. I directed, therefore, my attention to plants growing in this country; and I found to my great satisfaction that the common rushes (*Juncus effusus*, and others) contain 40 per cent. of fibre, quite equal, if not superior, to the papyrus fibre, and a perfect substitute for rags in the manufacture of paper, and that one ton of rushes contains more fibre than two tons of flax straw.

ON THE HANCORNIA SPECIOSA, ARTIFICIAL GUTTA PERCHA, AND INDIA-RUBBER.

BY THE CHEVALIER DE CLAUSSEN.

In the course of my travels as botanist in South America, I had occasion to examine the different trees which produce the india-rubber, and of which the *Hancornia speciosa* is one. It grows on the high plateaux of South America, between the tenth and twentieth degrees of latitude south, at a height from three to five thousand feet above the level of the sea. It is of the family of the Sapotaceæ, the same to which belongs the tree which produces gutta percha. It bears a fruit, in form not unlike a bergamot pear, and full of a milky juice, which is liquid india-rubber. To be eatable this fruit must be kept two or three weeks after being gathered, in which time all the india-rubber disappears or is converted into sugar, and is then in taste one of the most delicious fruits known, and regarded by the Brazilians (who call it Mangava) as superior to all other fruits of their country. The change of india-rubber into sugar led me to suppose that gutta percha, india-rubber, and similar compounds contained starch. I have therefore tried to mix it with resinous or oily substances, in combination with tannin, and have succeeded in

making compounds which can be mixed in all proportions with gutta percha or india-rubber without altering their characters. By the foregoing it will be understood that a great number of compounds of the gutta percha and india-rubber class may be formed by mixing starch, gluten, or flour with tanning and resinous or oily substances. By mixing some of these compounds with gutta percha or india-rubber, I can so increase its hardness that it will be like horn, and may be used as shields to protect the soldiers from the effect of the Minié balls, and I have also no doubt that some of these compounds, in combination with iron, may be useful in floating batteries and many other purposes, such as the covering the electric telegraph wires, imitation of wood, ship-building, &c.

ON THE EMPLOYMENT OF ALGÆ AND OTHER PLANTS IN THE MANUFACTURE OF SOAPS.

BY THE CHEVALIER DE CLAUSSEN.

When I was experimenting on several plants for the purpose of discovering fibres for paper pulp, I accidentally treated some common sea-weeds with alkalies, and found they were entirely dissolved, and formed a soapy compound which could be employed in the manufacture of soap. The making of soaps directly from sea-weeds must be more advantageous than burning them for the purpose of making kelp, because the fucusoid and glutinous matter they contain are saved and converted into soap. The Brazilians use a malvaceous plant (Sida) for washing instead of soap, and the Chinese use flour of beans in the scouring of their silk; and I have found that not alone sea-weed, but also many other glutinous plants and gluten, may be used in the manufacture of soap with advantage.

THE SALE OF METHYLATED SPIRIT.

We have received copies of the following correspondence from Mr. Carruthers, of Dumfries :—

"*Dumfries, Sept. 17th*, 1855.

"*To the Chairman of the Board of Inland Revenue,*
"*Somerset House, London.*

"Sir,—I have been in the habit of supplying hatters, polishers, &c., with naphtha, which article, for their purposes, is about to be superseded by the methylated spirit mentioned in Act 18 and 19 Vic., c. 37. The parties referred to are generally not in a position to purchase more than from about one to five gallons at a time, and as some doubts exist as to whether retail dealers, such as Chemists and Druggists, will, under the Act, be permitted to supply the methylated spirit in such quantities, I will feel obliged if you will kindly inform me on this point.

"I am, Sir, your most obedient servant,
"R. B. Carruthers."

"*Inland Revenue Office, Somerset House, London, 24th Sept.*, 1855.

"Sir,—I am desired to acquaint you, in reply to your letter of the 17th instant that retail Chemists, or others, who may obtain the authority of the Board to use methylated spirit in the preparation of varnishes, &c., may sell the spirit in any quantities to hatters and others, after there has been dissolved therein at least three ounces of shellac to every gallon of spirit; but it cannot be so sold in its pure state.

"I beg to forward a copy of the Regulations, and to remain,

"Sir, your faithful servant,
(Signed) "Wm. Corbett,
"*Assistant Under Secretary.*"

"Mr. R. B. Carruthers,
"*Dumfries.*"

OXYGEN IN A NASCENT STATE.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In your Journal for October is a paper headed "Researches on Oxygen in a Nascent State, by M. Auguste Houzeau," in which he proceeds to detail the results of certain experiments on the action of monohydrated sulphuric acid on binoxide of barium at a low temperature. By means of this reaction he obtains a

gas possessing properties entirely different from those of ordinary oxygen, which he terms "Nascent Oxygen."

I have no doubt that the results obtained are correctly described, but I conceive that in his reasoning on these results he makes use of a term in a sense which chemical science does not warrant him in doing.

Let us, in the first place, consider what is the nascent state of a body. A body is said to be in a *nascent state* at the moment when it is liberated from a state of combination, and before its component atoms have had time to exert their cohesive properties, or to enter into combination either with ponderable or imponderable matter.

A gas, therefore, cannot be a body in a nascent state, as, in order to become a gas, it must have combined with caloric.

An example of this combination of bodies in the nascent state is furnished us in the reaction of hydrogen at the moment of evolution on nitric acid, when, after uniting with the oxygen, it combines with the nitrogen to form ammonia, which combination cannot be brought about if these elements have previously assumed the form of gases.

The properties of the gas as obtained by M. Houzeau, and which he is perfectly correct in terming "Active Oxygen," are in my opinion due to the oxygen being in an altrotopic or ozonified state.

Ozone is well known to have all the properties which M. Houzeau attributes to his active oxygen ; and until he has other results to bring forward which ozonified oxygen would not produce, I conceive he would be more correct in styling his paper "A Contribution to the History of Ozone," than in making use of an expression in a sense which is calculated to lead to a confusion of terms.

October 18*th*, 1855. E. O. B.

OLEUM MORRHUÆ CUM QUINA.

TO THE EDITORS OF THE MEDICAL CHRONICLE.

Gentlemen,—As the above preparation has attracted some attention in England, and is frequently prescribed by medical men here, it may not be uninteresting to some of your readers if we describe the process we have found, after some experience, to be most successful.

A short notice of this article appears in the London *Pharmaceutical Journal* of March, 1855, which, however, furnishes no exact formula for its preparation, and merely states that it is a solution of anhydrous quina in cod-liver oil, prepared by adding the former in fine powder to the oil contained in a suitable glass vessel, and effecting the solution by heating in a water-bath. We have observed, that by the continued application of heat, a very unpleasant flavour is communicated to the oil ; so much so, as to form a serious objection to its use, and have endeavoured to avoid this difficulty in the following manner :—We dissolve the quina in a small quantity of strong alcohol, of sp. gr. 0.796, and find that when this solution is mixed with the oil and gently heated in a water-bath, the quina is dissolved without difficulty, as the alcohol evaporates. By this simple method, a perfectly clear liquid is obtained free from the strong flavour imparted by the ordinary process.

The following is the formula we have employed, obtaining anhydrous quina :—

Quinæ Disulph., ℥i.
Aq. Ferventis destill., Oij.

Dissolve the quinæ sulph. in the boiling distilled water, then add liq. ammoniæ in slight excess, and collect and carefully wash the precipitated quina. This should be dried on filtering paper and fused in a porcelain dish, in a sand-bath. Thus obtained, it presents the appearance of resin, being of a dark brown colour, translucent and soluble in almost any proportion in fixed oils. We have generally made our solution of the strength of two grains of quina to one ounce of cod-liver oil, but this may of course be varied to suit the pleasure of the prescriber.

A solution of caustic soda might be substituted with some advantage for liq. ammoniæ, as quina is slightly soluble in excess of the latter, causing a slight loss, which may be avoided by using the former precipitant.

We remain, Gentlemen, yours truly,

Place d'Armes, Montreal, July 31*st*, 1855. S. J. Lyman & Co.

BOOKS RECEIVED.

Quarterly Journal of Public Health, and Record of Epidemics and Hygiene; including the Transactions of the Epidemiological Society of London. Edited by B. W. Richardson. M.D. Published for the Proprietors by Samuel Highley, 32, Fleet Street. Nos. 1, 2, and 3. 1855. (From the Publisher.)

Etude Pharmaceutique et Médicale sur L'Huile de Foie de Morue. Par Th. P. Hogg, Pharmacien-Chimiste de l'école de Paris. Paris: Chez tous les Libraires de Médecine, et chez l'Auteur, 2, Rue Castiglione.

An Abstract of a Paper on the Application of Peat and its Products to Manufacturing, Agricultural, and Sanitary Purposes. By E. H. Durden, F.C.S., &c. Leeds: Edward Baines and Sons. 1855.

On Caries of the Teeth, and the Cure of the Toothache without Extraction. With Explanatory Engravings. By Donaldson Mackenzie, Surgeon-Dentist to the Royal Dispensary for Diseases of the Ear. London: John Churchill, New Burlington Street. 1855.

TO CORRESPONDENTS.

W. C. (London). — *Extractum Arnicæ:* Arnica flowers, in coarse powder, ℔j. Proof Spirit, ℔iiiss. Moisten the powder with half its weight of the spirit, and in twenty-four hours lixiviate it, packed in a displacement apparatus, with the rest of the spirit. Distil off the spirit and evaporate to a proper consistence. Paris Codex. In the Prussian Pharmacopœia the root is ordered.

W. M. (Hastings).—*Sale of Cocoa.* On further inquiry at Somerset House we find that cocoa is included in the licence for the sale of tea, coffee, &c., the cost of which licence is 18s. per annum, but there is no separate licence for cocoa.

A. S. (Preston).—*Iodide of Cadmium* may be made by digesting cadmium with iodine in water, the cadmium being in excess, and filtering the solution.

G. E. M. (Liverpool).—*Glycerine.* See page 233 of this number of the Journal.

M. R. S.—*Poplar Charcoal* may easily be made by putting poplar wood, cut in small pieces, into a crucible covered with sand, and exposing it to a red heat for about an hour.

A. B. (Alnwick).—(1.) There is no work on the cultivation of medicinal plants published, but much of the information required will be found in the proceedings of the Phytological Club, published in this Journal from time to time. See also several articles in this Journal—"Mitcham, its Physic Gardeners and Medicinal Plants," vol. x., page 115, 168, 236, 297, 340.—(2.) Fownes's *Manual of Chemistry*, 12s. 6d.

Dens (Birmingham).—Arsenic is used for the purpose of destroying the nerve of a tooth, but it requires care in the application.

G. M. R. (Aberdeen).—The duties of an Assistant in a Chemist's establishment would be incompatible with attendance at the lectures required for a medical education.

Adolescens (Bromsgrove).—*The Book of Prescriptions*, by Henry Beasley, published by Churchill.

Mr. Bottle, of Derby, has forwarded to us a Circular, by Hart & Co., respecting "an article called Gold Paint and Ink," which, although it has the appearance of gold when used as writing ink, is found to be obliterated on the application of an acid—proving that "all is not gold that glitters." It is sold wholesale in bottles at 4*s.* and 8*s.* a dozen.

Himalaya.—The letter, if received, has been mislaid; we must therefore request another statement of the case.

Manuscript.—See vol. xii., p. 70, of this Journal.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XV.—No. V.—DECEMBER 1st, 1855.

THE RESPONSIBILITY OF THE PHARMACEUTICAL SOCIETY UNDER THE PHARMACY ACT, 15 & 16 Vict., cap. 56.

So long as any doubt existed as to what might be the correct legal interpretation of the terms of the Pharmacy Act, the powers vested by it in the Society were held in abeyance.

All doubt or uncertainty having been removed, and the provisions of the Act as well as its intended mode of operation being now clearly understood, it is the duty of the Council to exercise faithfully the powers entrusted to them as the executive of the Society.

It is the intention of the Act as explained by the learned judges, that a distinction should be maintained, for the information and benefit of the public, between persons being Members of the Society or registered under the Act as Pharmaceutical Chemists, and those who are not so connected with or recognized by the Society.

It is clearly understood, that while it is the object of such membership and registration to create a recognized qualification in Pharmacy tested by an examination, which future Members will be required to pass, some indulgence has been granted, as in all similar cases, to the original Members in justice to vested interests; and that all Members who have complied with the terms of the Charter and Bye-laws, whether elected prior or subsequently to the date of the Act, are alike entitled to all the privileges of membership.

The privilege especially defined and guarded by penal clauses in the Act consists in the assumption and use of names, titles, or signs, denoting membership or registration under the Act, and the power of enforcing the penalties against persons illegally assuming the said privilege, is vested in the Council. The mode of proceeding in such cases is clear, and attended with little or no difficulty. Upon receiving official information that a person is fraudulently assuming a name, &c., implying that he is registered under the Act, or that he is exhibiting a certificate, purporting to be a certificate of membership, it is the duty of the Council to take such steps as they may be legally advised for enforcing obedience to the Act, or in default to sue for the penalties.

We sometimes receive anonymous letters from correspondents, signing themselves M.P.S., or some other initials, containing information respecting some alleged infringement of the Act, and complaining of the supposed negligence of the Council, in not proceeding against the accused parties. We take this opportunity of observing, that no attention can be paid to such communications, and that every appeal for interference under the Act must be made officially to the Council, authenticated with the name of the writer, and must contain *primâ facie* evidence sufficient to justify the Council in acting upon the information received. In the enforcement of the penal clauses of a recent Act of Parliament great discretion is necessary, and in all cases such powers should be exercised with moderation and impartiality, giving the accused the benefit of any doubt that may exist, and only resorting to extreme measures when absolutely necessary for the ends of justice. It is not by a large number of prosecutions, and a continual state of agitation, that the law is likely to be respected and observed, but the object to be desired is the full establishment and recognition of the powers of the Act, without exerting to the utmost the penal enactments which are intended to be held in reserve for extreme cases.

In the present position of the Society it is important that these powers and the object of them should be generally known, that no person should be taken by surprise or become inadvertently subjected to the penalties. But the time

has arrived when the distinction legally established by the Pharmacy Act must be enforced, and the Bye-laws of the Society duly observed. At an earlier period the Council discouraged the prominent display of the insignia of membership, because the effect to be produced by the Association was prospective; and the assumption of a nominal superiority before the educational resources of the Society had been matured, was calculated to place the Members in a false position. But during the last fifteen years an important change has taken place in the character and qualifications of the Members as a body; and the principle upon which the Pharmacy Act is framed, having been not only recognized by the Legislature, but fully sanctioned and confirmed by the highest legal authority in the country, the more completely the Members are identified with the Society, the more speedily will the desired effect be realized, and the influence of the Society be strengthened.

In the case reported in the Transactions of the Society for the present month (page 246), the parties wisely desisted from the illegal act, and did all that the Council required of them, on being communicated with by the solicitors of the Society. The offence is one which admits of no palliation, being a positive fraud upon the public, irrespective of the provisions of the Pharmacy Act. We have reason to believe that it is not an isolated case, as it appears that an engraved imitation of the shield and supporters, which are the prominent features in the certificate of membership, is executed in miniature, with the words "Member of the Pharmaceutical Society of Great Britain." This is sold in the form of a label to any person who may require it, the name and address being inserted according to order. The vendor of the labels may be under a belief that his customer is a Member, in which case he is not implicated in the transaction; but it should be generally known that persons not being Members using such labels, are liable to penalties, and that it is the duty of the Council to take proceedings when a fraud of this nature comes to their knowledge.

PHARMACY IN THE CRIMEA.

The accounts received from the Crimea respecting the supply of medicines to the army are not so precise as to give an accurate idea of the degree of efficiency of the Pharmaceutical establishment in the army. Each informant describes the aspect of affairs which is presented to his view, and while all parties concur in the opinion that there is room for improvement, they do not agree among themselves as to matters of detail.

The following communication will serve to illustrate these remarks:—

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—I forwarded to a friend in the East a copy of Mr. Brewer's letter, relating to the position and prospects of Dispensers in the Crimea, which appeared in the Journal of October; and if you consider his remarks therein worthy of a place in your next number, you are at liberty to print them.

I am, dear Sir, your obedient servant,

London Hospital, November 12th, 1855. T. H. Tusten.

"I am obliged to you for forwarding me the letter from the *Pharmaceutical Journal*. I cannot exactly make out what the writer complains of, but I suppose it is a want of rapid promotion. The Editor, I believe, is quite in the wrong about the apothecaryships. An apothecary in the army is simply a drug warehouseman. *The office has been reconstituted*, in order to give the authorities the means of rewarding with commissions men who discharge well their duties as Dispensers, and I hope that the appointments will not be made stingily. There are many men in the Crimea who deserve them. In my visit to the camp, I met with the Dispenser to the Third Division. He served there during the greater part of last winter. In addition to his proper duties, as Dispenser to the Division, he dispensed for the general hospital at the rear of the division, in which there were at times some hundreds of patients. He told me that for ten weeks at a time he had never left his hut for a quarter of an hour, and I heard the testimony of several of the

medical officers to the zeal and efficiency with which he discharged his duties ; and this, I dare say, is not a single case. They have always been short of Dispensers in the Crimea, and those there have been much overworked.

"Of course it will be argued that the creation of a number of commissioned apothecaries, for whom, in time of peace, there is no occupation, would entail an unjustifiable expenditure of public money, but I have never heard the same argument made use of in the case of generals, who swarm in the Army List, but not in the field. I hear, too, that there is to be a large creation of purveyors and deputy purveyors, for whom there will be as little occupation as apothecaries, and surely *the claims of Dispensers* to promotion cannot at the same time be overlooked. The talk about social position is all nonsense. If he passed an examination the Dispenser could only be a Dispenser, and would in nowise rank nearer a field-marshal. He would still be at the bottom of his profession, and must remain there. But there is something besides a diploma which levels ranks, and a man ought to know that he makes (for the most part) his *real* position for himself."

In the note above referred to, we used the term "Apothecary" to designate those army surgeons or assistant surgeons who are legally qualified to dispense medicines by possessing also the licence of the Apothecaries' Company. We are informed by several gentlemen who have returned from the Crimea, that a considerable proportion of the medicine is dispensed by the sergeants or "orderlies" of the regiments. The appointment of dispensers qualified for that office, but not medical practitioners, is by a recent regulation rather of a temporary character, and under the jurisdiction of the Director-General of the Medical Department The object to be desired for the efficient performance of the service is the regular introduction of a class of qualified Dispensers to take a position equivalent to that occupied by the Pharmaciens in the French army.

The *minimum* qualification required should be the certificate of having passed the Minor Examination of the Pharmaceutical Society. The introduction of such a regulation would afford an additional inducement to young men to qualify themselves and come up for examination. It would also exclude incompetent persons from the performance of the responsible duties in question, and it would place the regulations of the British army, so far as relates to the practice of Pharmacy, on a footing equal to that which has long existed in the army of the French nation.

The introduction of regulations of this description, giving advantages to those who have passed the Examinations of the Pharmaceutical Society, will tend greatly to promote the advancement of pharmaceutical education and the general objects for which the Pharmacy Act was passed. The Act not being compulsory, can only operate by means of the inducement it affords to young men to present themselves voluntarily for examination, as a means of enjoying, first, the status and rank conferred by association with the Society; and, secondly, the substantial advantages of situations, civil or military, which ought to be given only to qualified men. On the same principle the Royal College of Surgeons, although not directly supported by Act of Parliament, derives its weight and influence from the fact, that no surgical office under the Government, or in any respectable public institution, can be obtained by a person not possessing the diploma of the College of Surgeons. The consequence is, that the College Examination is a necessary ordeal which all persons desiring to take any office, or even to occupy a respectable position as Surgeons, are obliged to pass. We desire to see the same principle extended to the department of Pharmacy.

From the accounts received from various sources, private as well as public, we have reason to believe that the supply of medicines and medical comforts to the army in the Crimea is at the present time sufficient, and under proper distribution. This, however, is not all that is required. The drugs may be of good quality, the supply may be abundant—but it is of equal importance that there should be a staff of qualified "Pharmaceutists," to dispense the medicines for the sick.

ADULTERATION AND THE *LANCET*.

The *Lancet* is, as its name implies, a cutting instrument. It also bleeds. The mode in which it cuts is well known. The slashing process has been skilfully and unsparingly performed for a long series of years. Friends and foes have alike smarted under the infliction, and have occasionally changed places; while the *censor morum* has pursued the even tenor of its way, sustaining the character with which it was ushered into existence. The process of bleeding is not so generally understood, and is not attended with any symptoms visible by the naked eye of the uninitiated.

For many years we have been engaged in a continual warfare against the adulteration of drugs and articles of diet. Abstainiug from personalities, and not possessing the cutting instrument so powerfully handled by our contemporary, we have been content to lay before our readers such facts as came within our reach on this important subject. It has been sufficient for the purpose that a prevalent fraud or mode of adulteration was notified, the means of detection (whenever practicable) pointed out, and the impolicy, as well as the dangerous tendency of such practices demonstrated. It did not come within our province to gibbet individual offenders, or to assume the office of judge and jury between the vendor and the purchaser of articles known or supposed to be sophisticated. Desiring to trace the evil to its source, and attributing much of the delinquency which existed to ignorance or inadvertence, we directed our attack against *the system;* and the remedy on which we chiefly relied was improved education, and the diffusion of information of a precautionary nature on this particular subject.

The Editor of the *Lancet*, many years ago, made a thrust at the adulterators of food and drugs, but from some accidental circumstance the wound thus made healed by the first intention, and other objects of attack presenting themselves, the public were once more left with no other protection than that implied in the old maxim, "*Caveat emptor*." Medical reform, elucidated by a series of medical bills (which died anterior to parturition) amused the *Lancet*, and kept the instrument in cutting order for a few years; after which, on a lull taking place, and a dispute arising between the importers of coffee and the growers of chicory, we again find a paternal solicitude for the welfare of the public indicated by a revival of the attack upon adulterators. The "Analytical Sanitary Commission" came forth with its revelations. The press generally joined in the cry, the public became alarmed, shopkeepers trembled, and week after week a long list of tradesmen found their names in print under rather unpleasant auspices. The vibration occasioned by these proceedings penetrated the walls of the House of Commons, a Member of Parliament took up the subject, and hence the origin of Mr. Scholefield's committee. Here the curtain falls, and a fresh act of the drama commences.

As when a crysalis bursts its scaly covering, the grub within, expanding into a new existence, spreads forth its spotted wings, so did Dr. Hassall before the Parliamentary Committee emerge from his incognito and soar above his master's head in a new character—that of "the Analytical Sanitary Commission." The *Lancet*, astounded at the presumption of its bantling, produced a balance-sheet, and endeavoured to wind up the aspirant by an exposition of £ *s. d.* Another assailant simultaneously appeared in the field, and by a chemical process tarnished the splendour of the butterfly's wings, and brought him to the ground. The adulteration of food and drugs was thrown in the shade by the cutting and slashing which ensued; Mr. Redwood and the Editor of this Journal became involved in the *meleé*, the tables were turned, and the "Analytical Sanitary Commission" joining issue with the *Lancet*, threw the gauntlet at a meeting of the Pharmaceutical Society, a report of which will be found in this number, page 248.

The subject will be resumed at the next Meeting, on the 5th instant, on which occasion the prejudice of the public in favour of yellow cheese will be exposed and discussed.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

AT A MEETING OF THE COUNCIL,

Held on Wednesday, November 7th, 1855,

The President reported the result of a correspondence between the solicitors of the Society and two chemists and druggists, who had, in contravention of the Pharmacy Act, issued labels, on which was engraved an imitation in miniature of the certificate of membership, containing the words "Members of the Pharmaceutical Society of Great Britain." The parties are not and have never been registered as Pharmaceutical Chemists, and have not at any time been Members of the Society.

The Council had at a previous meeting received information respecting this fraudulent assumption of the name and insignia of membership, and had referred the case to the solicitors, with instructions to communicate with the delinquents, prior to commencing legal proceedings.

This being the first case in which the Council has instituted proceedings, by virtue of the powers vested in the Society under the penal clauses of the Act, it was thought right to give the accused every opportunity for explanation, so as to avoid, if possible, the ulterior course of proceedings in a court of law. Accordingly the solicitors, in a letter dated 11th October, directed the attention of the parties to the offence of which they were charged, under the 15 & 16 Vict., cap. 56, and concluded their letter in the following terms:—"We have to state on behalf of our clients, that no improper feeling of a hostile character is entertained; and, in the first instance, we request that you will inform us whether you will express regret for the past, give up the labels, pay all expenses incurred by the Society, and undertake that no announcement of the character to which we have alluded shall in future be made by your firm. In default of your compliance with these conditions, legal proceedings will be commenced without further notice." "We are," &c. &c.

It is considered unnecessary on the present occasion to publish the names of the delinquents; but it having been officially reported to the Council that they had, with an expression of regret and an apology, given up the labels, paid the expenses, and undertaken not to repeat the offence, and had also asserted, in extenuation, that they had been misled by the party from whom they obtained the labels, it was resolved that no further proceedings be taken in this case.

PHARMACEUTICAL MEETING,

Wednesday, November 7th, 1855,

MR. J. T. DAVENPORT, PRESIDENT, IN THE CHAIR.

The following donations were announced:—

The Medicinal and Economic Properties of Vegetable Charcoal, by J. Bird, M.R.C.S.
The Journal of the Society of Arts, from the Society of Arts.
The Journal of the Photographic Society, from the Photographic Society.
The Literary Gazette, from the Publishers.
The Chemist, from the Publishers.
Notices of Meetings of the Royal Institution.
List of Members of the Royal Institution, from the Royal Institution.
Fifteen specimens of Tragacanth and the Gums used for its Adulterations, illustrating the Paper "On Tragacanth and its Adulteration," by Mr. Maltass (See *Pharm. Jour.*, vol. xv., p. 18), from Mr. D. Hanbury.
Specimen of Salep from Persia, from Mr. Allchin.
Charcoal Biscuits, from James Bird, Esq.

DISTRIBUTION OF PRIZES.

The Prizes awarded to the successful competitors, at the conclusion of the last session, in the classes of Chemistry and Pharmacy, and Botany and Materia Medica, were given as follows :—

CHEMISTRY AND PHARMACY.

First Prize..... Mr. Jacob Hart Player.
Second Prize ..... Mr. Nathan Mercer.
Certificate of Merit ..... Mr. Daniel Amos.

The following were the Questions for Examination :—

1. Describe the methods of determining the specific gravities of *sugar*, *calomel*, and *wax*, giving the processes in detail.
2. What is the latent heat of water, and how is it determined? What is the latent heat of steam at 212°? Do the amounts of latent heat in water and steam vary with changes of temperature in those bodies?
3. Describe the phenomena of the *radiation*, *absorption*, *reflexion*, and *transmission* of heat, and state what bodies possess the greatest and the least power of thus affecting heat.
4. State the formula for *Mistura Ferri Composita* of the Pharmacopœia. Describe minutely the mode of preparing this mixture, the changes which occur in it, and the best mode of preserving it unchanged after its preparation. State the formula for *Liquor Potassæ arsenitis* of the Pharmacopœia. Describe what occurs in the process, and the nature of the product.
5. How are *Peroxide of Gold*, *Diniodide of Copper*, and *Potassio-tartrate of Antimony* prepared ?
6. State the composition of *cane sugar*, *grape sugar*, *dextrine*, *starch*, and *mannite*.
7. Explain the changes which occur in the conversion of barley into malt, and in the production of alcohol and acetic acid by fermentation, and describe the conditions most favourable to these operations.

BOTANY AND MATERIA MEDICA.

Second Prize ..... Mr. Henry Samuel Sams.
Certificates of Merit ..... Mr. William H. Hayward.
Mr. Charles Wm. Penton.

The following were the Questions for Examination :—

1. Describe the process of cell-development according to the views of both Schleiden and Mohl, and mention the opinions usually entertained with regard to their applicability in the different parts of plants ?
2. What are the distinctive characters between the stems and leaves of Monocotyledonous, Dicotyledonous, and Acotyledonous plants.
3. Define the following terms:—Glume, Cupule, Amentum, Umbel, Corymb, Cyme, Legume, Follicle, Capsule, Cone.
4. Give the essential characters of the following natural orders:—*Malvaceæ*, *Rutaceæ*, *Scrophulariaceæ*, *Gentianaceæ*, *Polygonaceæ*, *Euphorbiaceæ*. Enumerate the medical plants which they respectively contain.
5. Distinguish the *Polygalaceæ* from the *Leguminoseæ;* the *Dioscoreaceæ* from the *Smilaceæ*, the *Liliaceæ* from the *Melanthaceæ*, and the *Cyperaceæ* from the *Graminaceæ*.
6. What is the botanical source of Guaiacum ? Describe the mode of obtaining this substance, its physical and chemical characters, and the means you would adopt to detect it when used to adulterate Scammony.
7. Describe the botanical source and general characters of the officinal camphor, and state how you can distinguish it from both Dryobalanops camphor and artificial camphor.
8. Describe the physical characters of Russian, East Indian, and English rhubarbs. Mention, as far as is known, their botanical and geographical sources, and the mode adopted in collecting and preparing Russian rhubarb.
9. What are the commercial sorts of Sarsaparilla? State the districts from which they are believed to be obtained, as well as their supposed botanical sources. What are the characteristics of good Sarsaparilla?

*** Besides these questions, the candidates were examined practically on abou thirty medical and other plants.

Mr. Bentley said he had every reason to be satisfied with his class during the last session, not only as regarded the number of students attending, which was above the average, but also especially as to their general good conduct, diligence, and progress in their studies. He made a like favourable statement as to the students while attending at the Gardens of the Royal Botanic Society. He said that he had had the honour of being the Professor of Botany to the Pharmaceutical Society for the last seven years, and during that period no single complaint of the students had reached the Council from the Royal Botanic Society. This was a source of great gratification to him, as he was sure it would be to the Council generally, as it showed in a marked manner that the students of the Society were fully sensible of the great advantages they derived from being allowed the privilege of admission, for the purposes of study, to the Gardens of the Royal Botanic Society—a privilege not accorded to any other body of students in London. During the last eight years he had been connected with five large educational institutions, in which time he had had more than a thousand students in attendance at his lectures. He thought, therefore, that he might fairly say that he had had some experience as a teacher, and was accordingly fully qualified to form an opinion as to the general conduct of students. He made these observations preparatory to stating his belief that the students of the Pharmaceutical Society were not to be surpassed by any class of students in London, whether as regarded their regular attendance, general good conduct, or attention to, or progress in their studies. He made this statement because he considered it but an act of justice to the students, and also because he was sure that the Members of the Council, who had striven for some years to promote education among the Pharmaceutical Chemists, would be pleased to hear such a favourable statement as to their success.

Having made these observations, he regretted he could not make so favourable a statement as usual as to the competition for prizes; for the number of candidates was only four, and these were among the youngest members of the class. In consequence of these circumstances, as might have been supposed, the answers of the candidates were not so satisfactory as he could have wished; and he should therefore only recommend to the Council the award of a Second Prize and two Certificates of Honour. He regretted this circumstance very much. At the same time it would prove to the students that on no occasion would prizes be awarded to them, unless they showed that they fully deserved them. Mr. Bentley attributed the small number of candidates at the last prize examination to the circumstance that many of the students would not compete, for fear of being unsuccessful. He hoped that this would not occur again, for there was no disgrace in being beaten when a student had done his best to achieve success; and, moreover, the chief value of a prize consisted in the fact that, in obtaining it, the student had been obliged to gain an amount of information, which would be invaluable to him in after life. Mr. Bentley's advice, therefore, to students in future, was to attend regularly at the lectures, to read diligently afterwards, and in every way strive to become acquainted with the subjects treated of, and then they need not fear to contend for prizes; for in such a case, even if unsuccessful, they would not be disgraced, because they would have striven to the best of their abilities to ensure success, and would be so regarded by their teachers.

Mr. Bentley, in conclusion, said that he had great pleasure in presenting to the President, as the successful candidate for the second prize, Mr. Sams; and he thought it but justice to this gentleman to say, that although his answers were not such as to warrant the award to him of the first prize, yet at the same time they were very creditable to him, especially so on account of his youth. Mr. Bentley also said that the two gentlemen to whom Certificates of Honour had been awarded, had well and justly earned their distinction.

CHLOROFORM AND ETHER FROM METHYLATED SPIRIT.

Mr. McFarlane, of Edinburgh, thought it might be interesting to the meeting to learn the result of the attempts which had been made to prepare chloroform and ether from the methylated spirit which manufacturers were now allowed to use free from duty. It had been feared that the smell of the naphtha would so far contaminate the chloroform and ether when made from the mixed spirit as to render them unfit for many of the purposes to which they are applied. He had succeeded, however, in getting both the products mentioned in a great state of purity. The chloroform was entirely free from any flavour derived from the naphtha, and the ether he thought would be considered as good as much that is made in the usual way from spirit of wine. He regretted that he had not brought samples with him, but he would send some to the next meeting.

Mr. Redwood was gratified to hear Mr. McFarlane's statement. The subject was one in which he was naturally interested, from the part he had taken in recommending the measure which was now under trial. In the experiments made by the Commissioners, prior to their sending in their report, the chloroform and ether made from the methylated spirit were found to retain a slight flavour, derived from the naphtha, and which was perceptible on allowing them to evaporate spontaneously from a piece of blotting paper. Subsequent experiments, however, had convinced them, that that flavour could be got rid of by a very careful process of purification, and this was now confirmed by Mr. McFarlane's statement.

Mr. Jacob Bell directed the attention of the meeting to Mr. Bird's Charcoal Biscuits, which were recommended as useful in some disorders of the alimentary canal. Charcoal was on the list of remedies which have been said to be useful in certain stages of cholera, and these biscuits, each of which contained ten grains of very carefully prepared charcoal, afforded an easy and palatable mode of administering the remedy in the form of an article of diet.

ADULTERATION OF DRUGS.—DR. HASSALL & MR. REDWOOD.

Dr. Hassall, addressing the Chairman, said he had been given to understand that, at the previous meeting of the Society, an attack had been made upon him by Mr. Redwood, in the course of some observations which were communicated by that gentleman on the adulteration of annatto, and that expressions were used which the Chairman had occasion to complain of.

The Chairman said Dr. Hassall was wrong in assuming that such expressions were used by Mr. Redwood. He, the Chairman, had certainly, in the first instance, understood Mr. Redwood to impugn the accuracy of the facts stated in Dr. Hassall's book, but Mr. Redwood, in explanation, denied having said anything to that effect, and therefore any objection which he, the Chairman, had felt to Mr. Redwood's remarks was entirely removed.

Dr. Hassall proceeded to observe that he held in his hand the *Pharmaceutical Journal*, which contained a report of the meeting alluded to, and although he believed that what really occurred at the meeting was considerably modified in the report, he would take that report as he found it, and he had to complain of the manner in which his competency for the duties he had undertaken in connexion with the Analytical Sanitary Commission had been assailed. Mr. Redwood had thought proper to make a cowardly and ungentlemanly attack upon him behind his back, without giving him any notice of his intention of doing so, and without adducing any evidence in support of the charge. He, Dr. Hassall, challenged Mr. Redwood to prove what he had so rashly and unjustifiably asserted. During the investigations he had made, the results of which were published as the reports of the Analytical Sanitary Commission, he had performed more than 2000 analyses, and in only one instance was the accuracy of those analyses called in question. If Mr. Redwood thought him

incompetent why did he not call his results in question at the time they were published, instead of waiting until a difference arose between him (Dr. Hassall) and the editor of the *Lancet?* No doubt Mr. Redwood thought this a favourable opportunity for making an attack which he was previously afraid to make. But Mr. Redwood had failed to adduce any evidence of incompetency, or of his having made any errors in the numerous analyses he had performed, and he was therefore wholly unjustified in making the attack of which he (Dr. Hassall) complained. He begged to offer a word of advice to Mr. Redwood, not in future to attack a man behind his back, and without any evidence to support the attack; and he would offer a word of caution to the Society, to be careful how they connected themselves with Mr. Redwood in the course he was pursuing in reference to the subject of adulteration, lest it should be thought that they were disposed to justify the practices complained of.

Before concluding, he wished to notice another subject. He understood there was a general impression among the body of Pharmaceutical Chemists, that in his evidence before the Committee in the House of Commons he had represented Apothecaries' Hall as the only place where pure drugs could be obtained. This was an erroneous impression. What he really did say, as given in the minutes of evidence, was as follows:—

"Question 124. *Mr. Villiers.*—There are some places, are there not, where you may always obtain genuine drugs, such as Apothecaries' Hall?—All adulterations of drugs may be divided into two classes; the adulterations which are practised on those drugs before they reach this country, and the adulteration which the drugs experience after their arrival here. In all cases you cannot insure obtaining a genuine drug from any seller of drugs in this country, because he cannot answer for what may have been done with the drugs before they reach his hands.

"125. Do not they retail drugs at Apothecaries' Hall, and are not they sure to be genuine?—In the great majority of cases they are.

"126. Do not they submit them to some test?—If they did not do so there would be no certainty that in buying opium or scammony you would obtain it genuine.

"127. *Mr. Peacock.*—Have you examined any samples obtained from Apothecaries' Hall?—Yes, and I never met with any adulterated article from Apothecaries' Hall; but I have not examined more than three or four samples coming from Apothecaries' Hall. Still I should think, as that is a recognized and regularly constituted body, you would be tolerably secure of getting genuine drugs from them whenever it was possible to procure them."

Now what he intended to convey by his answers to Mr. Villiers and Mr. Peacock was, that Apothecaries' Hall, being an incorporated body, would be likely to have genuine drugs, but he did not say or in any way imply that there were not many other establishments where equally genuine drugs could be obtained.

Mr. Waugh regretted that Dr. Hassall, in his evidence before the Parliamentary Committee, had not mentioned, what he now admitted, that there were many other establishments, besides Apothecaries' Hall, at which genuine drugs could be obtained. If he had done so he would have removed the objection which attached to that part of his evidence. But having first spoken of the great extent to which adulterations were practised by Druggists, without qualifying this charge by referring to any exceptions, and then having expressed his opinion that genuine drugs were sold at Apothecaries' Hall, it would be naturally inferred that this was the only establishment he knew of where the public could rely on getting genuine drugs.

Mr. Redwood, in reply to Dr. Hassall, said the report which appeared in the *Pharmaceutical Journal*, did, he believed, correctly represent the substance of what he had stated at the previous meeting. The report had been drawn up by himself, and, although it was not, and did not profess to be, a complete report of what was said, yet he had been more than usually anxious that it should fairly represent the personal allusions he had made. He certainly had

stated that he did not consider Dr. Hassall to be qualified for performing the numerous chemical analyses upon which the reports in *The Lancet* were founded. This opinion was based upon evidence contained in Dr. Hassall's letters which had been published in *The Times* by Dr. Letheby, and which had not been contradicted or explained by Dr. Hassall.* It could not, surely, in the face of such evidence, furnished by Dr. Hassall himself, be considered an unjust imputation to say that he was not a qualified analytical Chemist. The evidence was before the world as widely diffused as *The Times* newspaper would necessarily make it; it remained uncontradicted, and while this was so, no Chemist could form any other conclusion than that which he had expressed. He (Mr. R.) had also said of the Analytical Sanitary Commission, that if it was, as represented by Dr. Hassall, composed of only himself, the adoption of the imposing title was calculated to deceive the public. What, he would ask, did the public understand by a commission appointed for an important public investigation? Was it not understood to consist of an association of men selected on account of their qualifications for the duties they had to perform? When, however, it was ascertained that the Analytical Sanitary Commission, which had created such a stir, consisted of one individual, who was ignorant of the commonest rules of chemical analysis, so much so that the veriest tyro in Chemistry would be ashamed to ask such questions as he had put to Dr. Letheby, it was not to be wondered at that those acquainted with the facts of the case should lose their confidence in the results which had been published, and should look upon the Commission as a sham and deception. During the period that the reports of the Commission were being published he (Mr. R.) had been frequently asked whether something ought not to be done to counteract the effects of such publications, but he had always said that if the investigations were fairly made he thought they would be productive of good. Had he been then in possession of the evidence now before him, he should probably have considered that it was necessary to guard against the infliction of injustice upon honest tradesmen, which would be likely to result from the exercise of a very important and responsible duty by an incompetent person. Dr. Hassall had accused him of cowardice and ungentlemanly conduct, in having attacked him behind his back. He trusted that Dr. Hassall would do him the justice to believe that he had no ill feeling towards him, but Dr. Hassall's name was so intimately associated with adulteration, that this subject could not be fairly discussed without some reference being made to him and his publications. Dr. Hassall had put himself forward as a public accuser, he had not hesitated to accuse men behind their backs, and to stigmatize many honest men as adulterators who were innocent of the charge. He (Mr. R) was not aware that he was overstepping the bounds of propriety in speaking of the public conduct of a public man, even if he were not present. He had referred to Dr. Hassall as an author, just as he would refer to any other author who had published on the subject under discussion. If he had been speaking of Dr. Pereira's work he should have spoken of it as a work of

---

* Dr. Letheby, in the *Times* of July 30th, 1855, says :—"I will put it to any practical Chemist whether it was possible for any man to proceed with an important research, who would ask such questions as the following ?—

"'Will you kindly give me the process for the quantitative analysis of iron ? Is the Prussian blue, which subsides on the addition of the ferrocyanide of potassium, soluble in excess of the precipitant ?'

"Again, after having received instructions from me respecting the examination of porter, he says,—'I am getting on very well with the porters; but one difficulty which presents itself to me, is the best method of detecting sulphate of iron in porter. It would not be thrown down, I believe, either by the acetate of lead or the sulphuretted hydrogen used ; in which case, if present in the porter, it ought to be found in the sugar obtained by the evaporation of the fluid portion of the porter, freed from acetate of lead. Is this so ? A line to steer me right in the matter would greatly oblige.'

"I have many such questions as these. They are in Dr. Hassall's own handwriting ; and I regret he has made it necessary that I should allude to them."

high authority, but he did not consider Dr. Hassall's work to be one of high authority, and therefore he could not speak of it as such. The subject he had to treat of rendered it necessary that he should refer to Dr. Hassall's work, and he had candidly expressed the opinion which he honestly entertained of it.

Mr. Clark (of the *Lancet*) thought that in a question relating to a series of scientific researches, a grave charge, such as that made by Mr. Redwood, ought not to have been advanced without some positive proofs—whereas Mr. Redwood, although he had certainly, on the present occasion, spoken with much openness and without any evidence of cowardice, had not brought forward any facts to substantiate his accusation.

Mr. Redwood.—Are the letters facts?

Mr. Clark admitted that the letters were facts, but he conceived that, in a case of this sort, Mr. Redwood, before he impeached Dr. Hassall's qualification as a chemist, should have been prepared to show that the results he had published were incorrect. He should have been glad to have heard from Mr. Redwood whether he had made any experiments to test the accuracy of Dr. Hassall's results, and whether he had detected any errors.

Mr. Redwood said he was quite ready to state that he had not tested the accuracy of Dr. Hassall's results. At the time they were published he presumed they had been obtained by a competent chemist.

Mr. Clark regretted to find that Mr. Redwood had formed his opinion upon such imperfect data.

Dr. Normandy said he also had to complain of the use which had been made of his name at the previous meeting of the Society. He thought that something extraordinary must have occurred on that occasion, for he had been told that he was accused not only of incompetency, but of something worse—of having stated that which was not true. When this was represented to him he called on Mr. Redwood, who at once denied having alluded to his competeney or veracity, but admitted having made a reference to his (Dr. Normandy's) book, in connexion with others, and to that he could not object. But he had since been informed that Mr. Redwood had found fault with the method he had described in his evidence for the detection of alum in bread. Now, it was true that in the minutes of evidence there was a slight omission which rendered the process imperfect, but that was no fault of his. He challenged any one to impugn the correctness of his process for detecting alum in bread; and with regard to the statement he had made of the quantities of alum found in bread, he was prepared to prove its accuracy. Some exception had been taken to his statement that he had found crystals of alum in a loaf, but he had witnesses to prove the fact, and he could now add that it was not a solitary fact, for another instance of a similar sort had quite recently come under his notice, and in this case the bread in which the alum was found had been supplied by his own baker.

Sir Charles Aldis did not think that what had been stated by Mr. Redwood could be objected to. And with regard to the employment of alum in making bread, he thought the evil likely to result from it had been greatly overrated. In the small quantity in which it was used he did not think it was hurtful.

A Member remarked that the alum used by bakers in making bread was always added while in solution, and the crystals found by Dr. Normandy must therefore have got there accidentally.

Mr. Redwood said that Dr. Normandy had afforded, in his observations, an explanation of what had previously been to him a complete enigma. He could not conceive how anything he had said at the previous meeting could have been construed into a charge of incompetency or untruthfulness against Dr. Normandy. He knew that he could not have said anything to that effect, because it would have been wholly at variance with his opinions and feelings. Even when he found that this version of what had passed at the meeting had been communicated to Dr. Hassall by Mr. Bastick, although he could account for a little colouring derived from the medium of communication, yet he was puzzled

to think what could have formed the foundation for the statement. It now appeared, however, that it was an allusion he had made to the process described by one of the witnesses before the Parliamentary Committee for detecting alum in bread. Now, it so happened that he had not referred at all to Dr. Normandy's process, but to a very absurd process described by a Mr. Postgate. While speaking on this subject he might perhaps be allowed to say that he accepted Dr. Normandy's challenge, and was prepared to impugn his process for detecting alum in bread. The process was a perfectly good one for detecting the elements of alum, from which it might be inferred that alum had been used in making the bread, but it did not follow that the alum existed, as such, in the bread after it was made. He had reason to believe that alum, when not used in excess, was decomposed in the process of bread-making, in which case, although the alumina and other constituents might be found in the bread, there would be no alum there, and consequently none of the astringency which had been referred to as the principal evil in its use. This, however, was too wide a question for discussion on that occasion.

Mr. McFarlane, having carefully read the report of the previous meeting, and heard all that had been said upon the subject, did not think there was anything in what Mr. Redwood had said that could justly be complained of. Indeed, it appeared that Dr. Normandy was pretty well satisfied with the explanations that had been given. With reference to the presence of alum in bread, which it seemed the doctor found in such quantity that crystals of it could be detected, and that in the bread supplied by his own baker, he (Mr. McFarlane) wished to ask the doctor how long he had been supplied with bread by this baker?

Dr. Normandy.—For several years; but although I have examined some hundreds of samples of bread from other sources, I never thought of examining that of my own baker until the occasion referred to.

Mr. McFarlane thought the doctor, considering that he had been fed for several years on bread containing such a large quantity of alum, afforded pretty good evidence that it was not very injurious to health. He would suggest to the baker to appeal to the doctor's portly person in vindication of the quality of his bread. Perhaps, after all, a little alum was not a bad thing to use in making bread. He was disposed to think that that, or something equivalent to it, was required to produce good bread from much, although not all, of the wheat grown in our uncertain climate. If by the addition of a small quantity of alum, wheat that would not otherwise yield good bread could be made available for that purpose, and if the alum so used was decomposed in the process, as suggested by Mr. Redwood, so that none of the astringency that had been talked of could exist—he thought the adoption of such a process not only harmless, but beneficial. The view which had been suggested by Mr. Redwood was a very important one, and he hoped it would be worked out and fully developed.

Mr. Jacob Bell said this subject was one especially suitable for discussion at these meetings, and he thought it important that no misunderstanding should exist as to the views of the Society generally, in reference to it. In a large proportion of their meetings during the last fifteen years, frauds and adulterations had been exposed and discussed. He thought he was quite within bounds in saying that the subject formed a portion of the business of at least one meeting in three. It was one of the fundamental objects of the Society to improve the quality of drugs and chemicals, and to introduce a more efficient mode of conducting the business in all its departments. This was to be effected by means of improved education, by the advancement of science, and by infusing a professional character among those who represent Pharmacy in this country. These having been the views and objects of the Society, it would not be suspected by any one that they could entertain any sympathy with the perpetrators of a series of frauds, which it had for so many years been their constant endeavour to expose and denounce. But they had all been accused

and attacked behind their backs. Whatever might have been the intention of their accusers, or however they might endeavour to explain away the allegations, there was but one impression deducible from the tenor of the statements, and that was, that the entire body were implicated in the offences described. One witness (Dr. Normandy) had stated in plain terms, as reported in the daily papers, that "the Chemists and Druggists of this country knew nothing of Chemistry: they were merely dealers in drugs." He had not alluded to the existence of the term Pharmaceutical Chemist, or drawn any distinction between one class and another. It was therefore obvious that the term Chemist and Druggist was used in its extended sense to include all, and this was the evidence of a gentleman who had for years been in the habit of attending their meetings as a visitor, who was not ignorant of the fact that for above fifteen years they had been striving, by every means in their power, to expose and discountenance the abuses complained of, to raise the qualification of the members of their body, and to protect the public against the dishonest practices of ignorant or designing men. All this Dr. Normandy knew, and yet in his evidence before the Parliamentary Committee he had not one word to say in palliation of his general assertion, by which he in one breath stigmatized the entire Pharmaceutical body as ignorant and unqualified. The tendency of Dr. Hassall's evidence, and that of some other witnesses, was to produce the same impression on any person reading it literally. He therefore considered that they were called upon, in self-defence, to rebut the charges, to point out what portions of the evidence were unfair or exaggerated, and to place the case in its true light. He (Mr. Bell) had received many letters from correspondents, inquiring whether the Society would take any steps to counteract the pernicious and unjust effect likely to be produced by the evidence which had been extensively circulated against their body in all the newspapers. He thought that was a suitable opportunity. He hoped the subject would not be dropped, but that the facts would be sifted in the most searching manner. Their only object should be to elicit the truth, and rectify any existing abuses. The publication of exaggerated statements was calculated to injure a good cause, by throwing a shade of discredit over all the disclosures that had been made. Justice also demanded a full and fair investigation of a series of grave charges published without reservation, and affecting the character of the parties to whom they referred.

Dr. Normandy expressed regret that he had in his evidence omitted to make any allusion to the Pharmaceutical Society. This omission was accidental. He had forgotten it at the time he was giving evidence.

Mr. Bastick wished to state, as he had been referred to as the person who had communicated the proceedings of the previous meeting to Dr. Hassall, that so far from his having given a colouring to what had passed at the meeting, he declined to describe what passed, and referred Dr. Hassall to the Chairman.

Mr. Redwood said, his authority for stating that Mr. Bastick had communicated the proceedings to Dr. Hassall, was a letter written by Dr. Hassall to Dr. Normandy, in which the former said he had heard from Mr. Bastick that Mr. Redwood had made a most scurrilous attack upon himself and Dr. Normandy, accusing them of being incompetent and impostors.

Dr. Hassall admitted that he had written such a letter. Perhaps he might have expressed himself at the moment rather more strongly than Mr. Bastick's statement justified; but he thought Dr. Normandy ought not to have shown his note to Mr. Redwood, as it was not intended for publication.

Dr. Normandy differed in opinion on this point. He was an advocate for perfect openness in these matters. Having been on friendly terms with Mr. Redwood for many years, he took Dr. Hassall's note to him as soon as he received it, and Mr. Redwood immediately gave the same explanation as he had given that evening.

The Chairman said, when Dr. Hassall called upon him on this subject, he told him that whatever had at first appeared to him objectionable in Mr. Red-

wood's observations was immediately explained to his satisfaction when he called Mr. Redwood's attention to it. Dr. Hassall then said that he had the report in the *Pharmaceutical Journal*, and he would confine himself to that.

ADULTERATION OF ANNATTO.

Dr. Hassall said if he might be allowed he would read a paper on this subject at the next meeting of the Society.

The Chairman said that it rested with a Committee to decide what papers should be read, but no doubt Dr. Hassall's paper would be accepted.

Specimens of a newly invented and patented wood-box, made by machinery by Mr. Robertson, were on the table; but the attention of the meeting was not directed to them, the time having expired. They will therefore be noticed at the next meeting.

PHYTOLOGICAL CLUB.

17, *Bloomsbury Square*, *November* 14*th*, 1855.

ROBERT BENTLEY, F.L.S., PRESIDENT, IN THE CHAIR.

Several candidates proposed at the last meeting were elected Members of the Phytological Club.

Donations of plants were announced by Mr. Wood from Mr. Hill and from Mr. Meatyard, of Basingstoke, for which the thanks of the meeting were voted.

Mr. Blyth laid specimens of ergotised grasses on the table, which had been collected from different parts of the country.

Mr. Daniel Hanbury reported on behalf of the Committee, appointed at the last meeting held in May, to arrange the plants belonging to the Club, that 186 species had been added to the herbarium of reference, which now contained upwards of 520 specimens. A large number of duplicates, amounting to 2200 specimens, and consisting of about 500 species, remained in the hands of the Curators for distribution. Those Members who wish to obtain specimens should forward a list of desiderata, as early as possible, to Mr. Wood, 17, Bloomsbury Square.

The next meeting of the Club will be held on Wednesday, December 12th, at half-past eight o'clock, P.M.

PHARMACEUTICAL SOCIETY,

NORTH BRITISH BRANCH.

A Scientific Meeting of the above Society was held in Edinburgh, in the Society's rooms, 72, Princes Street, on Tuesday evening, 30th October, at nine o'clock,

MR. JAMES GARDNER, PRESIDENT, IN THE CHAIR.

The meeting was very fully attended by Members, Associates, and others.

The President proceeded to give the following Introductory Remarks :—

"Gentlemen,—As President of the Pharmaceutical Society I have great pleasure in meeting the Members, Associates, and Apprentices at the commencement of another Session.

"The Pharmaceutical Society being now relieved from any anxiety as to the results of the vexatious litigation in which it has been involved, is now vigorously carrying out its legitimate plans for the encouragement of education, and the professional improvement of all its Members.

"I am therefore particularly desirous to impress on all the Members, and more especially on the Associates and Apprentices, the great importance of the favourable opportunities for improvement that will be afforded to them this Session.

"First. Dr. Stevenson Macadam's Course of Lectures on Chemistry, at a convenient hour in the evening, and a very moderate fee.

"Secondly. The use of the Library (without any fee whatever), in which many of

the best modern authors on Chemistry, Pharmacy, Botany, and the sciences therewith connected, are to be found; and, as an additional stimulus, the following valuable and interesting works have been added to the library, which I hope will create an increase in the number of readers much greater than during any previous Session, viz.:—*Lardner's Essays; Liebig's Report*, 4 vols.; *Half Hours of Best Authors*, 2 vols.; *Novelties in Science; Morfitt's Report; Matteucci on Food; Johnston's Chemistry of Common Life*, 2 vols.; *Brougham's Lives of Eminent Men; Ure's Dictionary*, last edition, 2 vols.; *Abercrombie's Moral Feelings; Paris Pharmacologia.*

"The Members of the Pharmaceutical Society have great reason to be well pleased with what has been done in former Sessions, and I am satisfied that if each Member will only lend his help by contributing from his daily practical experience in dispensing, or in preparing the compounds of the Pharmacopœia or the chemicals of commerce, the present Session will not be without interest; and should any of our Members contribute new investigations or discoveries, the whole Society will feel the obligation the greater.

"The Council have ordered considerable additions to the Museum and Library accommodation, and will be happy to receive such books and specimens as Members may find convenient to present. I have to thank those gentlemen who have already contributed to raise the Museum and Library to their present condition.

"Dr. Macadam's Lectures commence on Monday, the 12th November, at a quarter past 9 P.M., and will be continued, during the winter six months, every Monday and Thursday.

"In consequence of Thursday being occupied by Dr. Macadam's lecture, it will be necessary to take Wednesday evening (instead of Thursday evening) for the Library, from a quarter past 9 to 10 o'clock, when books will be given out and taken in. The rules of the Library may be known at the Society's rooms.

"In order that Associates and Apprentices may take advantage of the Society's arrangements, I would earnestly solicit the co-operation of Members and masters, allowing as much time for these purposes as they possibly can spare."

Dr. DOUGLAS MACLAGAN thereafter addressed the meeting as follows :—

"It was with the greatest diffidence that I undertook the office of addressing you this evening. I have distrusted my ability to do so in a manner which shall be acceptable to you, and believe that I should best have consulted your interests, as well as my own feelings, had I resigned the duty to some one more likely to discharge it efficiently. But I have felt that I was not entitled to enjoy the honorary membership of the Pharmaceutical Society, without being prepared at least to show my willingness to promote its interest, so far as lay in my power; and it was with this feeling therefore that I undertook some time ago to deliver an introductory address at the first meeting of this Session. If I felt distrust in undertaking a duty which was discharged so efficiently last year by the distinguished Professor of Materia Medica in the University, still more do I feel it when I now come to the performance. It was only about a fortnight ago that I was reminded that the time was at hand for resuming your pharmaceutical meetings; the amount of leisure at my command was much less than I could have wished for undertaking anything beyond the ordinary duties of professional life, and of this leisure a large part has been lost by an unexpected journey to England, and unavoidable detention there for several days. Under any circumstances I should have craved your indulgent consideration, but still more must I do so for an Address, for the preparation of a good part of which the railway carriage was my study—Bradshaw my writing table, and Memory my only reference to documents. An address on such an occasion ought to combine the *utile* and *dulce;* but this happy compound, in proper equivalents, I cannot hope to offer you; and therefore, eschewing all attempts to make my address ornamental, I shall endeavour to make it useful. With this view, I beg to offer some observations of a general nature, and then to submit some suggestions which have occurred to me as being likely to aid in giving value to some of your future meetings. I would wish to bring under your notice a few questions which may, I think, profitably engage your attention, and which you, as practical pharmaceutists, are the parties competent to answer; but want of time to look into recent pharmaceutical literature, compels me, to my great regret, to do this very imperfectly.

"I would first offer a few remarks of a general nature. Your meetings consist, not only of Members of the Society at the head or in charge of pharmaceutical

establishments, but of junior assistants, along with whom I would include those who have not yet completed, or have only entered on their pupilage, and from whose numbers your ranks are afterwards to be recruited. I beg to address a few words separately to each.

"It is no part of my intention to enlarge upon so trite a subject as the importance and duty of using every exertion to elevate the character of the pharmaceutical profession in Britain. I am sure that I am giving no offence to the old-established Members of the Pharmaceutical Society, when I say that though much has already been done in this direction, much yet remains to do. I might be afraid of giving offence in thus expressing myself, if I had not reason to believe that you are yourselves most ready to admit this. You have expressed it in words, and still more strongly in acts. Contrary to the practice of most interests requiring reform, you did not oppose, you yourselves clamoured for it; you did not grumble that too necessary a measure was forced upon you, you complained only that it was hardly full enough, and it was your own desire to improve and elevate your profession, that led you to obtain from the Legislature an enactment recognizing the importance of full education and examination as the tests of a qualified Pharmaceutical Chemist. This is neither the place nor time to discuss how far the Pharmacy Act of 1852 was a satisfactory measure. I avow myself one of those who think it imperfect, and that I could wish to see the status of the Pharmaceutical Chemist better defined than it at present is, and some more positive idea attached to this designation, the force of which few of the lieges comprehend, and which probably few of the lieges know to have any force at all. I feel confident that the time will come, when there will arise the necessity for drawing some better distinction, than now exists, between the properly qualified pharmaceutist, and those who may venture to assume his offices without adequate preparation. How this is to be done, I must leave to wiser heads than mine to determine; it has not yet been done for the medical profession, and everybody knows how fertile a subject of discussion this and every other department of medical reform has been. I shall not pretend therefore to say how or when it is to be done; but I venture to express an opinion as to how and when it ought not to be done. It ought not to be done by penal enactments against the exercise of the profession by unqualified parties, either as regards medicine or pharmacy. This would accomplish it only by producing strife and rancour—to my mind it will never accomplish it at all. It ought to be by better statutary recognition and encouragement of the qualified, rather than by direct restriction on the unqualified. Let every legitimate endeavour be made that in the public services, in our hospitals and dispensaries, the superintendence of the pharmaceutical department be entrusted only to those who have been tested and found qualified. Let the meaning of the term Pharmaceutical Chemist, as described in the Act of Parliament, be better explained to the public, the majority of whom I believe regard it as only a sesqui-pedalian word for a man who dispenses or sells medicines, and has red and blue bottles in his window. Contest every vacancy in the laboratory of an hospital or dispensary, by putting up truly good candidates, and supporting them with proper *esprit de corps*. Let the laity know that there is a class of men who possess qualifications which specially fit them for these public appointments, and then they will soon learn that your designation is not a piece of Greek bombast, but is the distinctive style and title of those on whose professional skill and qualifications they may have full confidence.

"I have ventured on an opinion as to *how* the elevation in the status of your profession by future legislation ought not to be attempted. I would also state my notions as to *when* it ought not to be tried. It ought not to be attempted at present. 'The pear is not ripe,' either on your tree or mine. We of the Medical fraternity are sick of medical reform. Our profession has swallowed doses of it year after year; but, like the Irishman's emetic, not one of them would stay on its stomach. The last dose was a worse sickener than any that preceded it. We are ready for a plain measure securing authoritative registration, you already possess something of this kind, but it might be improved, if not in plan at least in working. For anything further the time has not come. Proper reform, both in your profession and mine, must begin with self-reform; without this, Acts of Parliament will not be worth the paper on which they are printed. One of the greatest impediments in the way of adjusting the subject of medical reform has arisen from considerations connected, not with the practice of medicine and surgery, but from the unhappy

circumstance that it is the common custom, more especially in England, for the same man to be both practitioner of medicine and dispenser of drugs. It is the right to practise this last department, which has been one of the chief bones of contention: it has made England jealous of Scotland, and Scotland envious of England : it is on this rock that all our attempts to secure uniformity of privilege with uniformity of education have split. I am persuaded that if medical practitioners were to abandon the practice of making a profit of the sale of drugs there would be less jealousy, more cordial feeling, and a better *esprit de corps* among us, and that our demands for reform would be answered with comparative facility. I have thus explicitly stated what I believe to be a fault on the side of my profession, but I must with equal frankness remind you that they have a *per contra* charge against yours. The Chemist has in too many instances invaded the domain of the medical attendant; and counter-practice, or even more than this in some cases, has made the practitioner jealous of the pharmaceutist. Now to settle these differences by Act of Parliament appears to me to be perfectly chimerical. There are districts of the country where the medical attendant must play the Druggist's part, where a Chemist would never find business enough to maintain himself; and I would have every holder of a medical or surgical diploma sufficiently well instructed in pharmacy to be able to do that if necessary. There are little emergencies where a Druggist when applied to in his shop may most legitimately offer a trifling advice, without doing anything which should excite the jealousy of the medical practitioner. It would be tyrannical, if it were not impossible, to prevent these occurrences by legislation. But they ought to be the exceptions arising from that necessity which knows no law, and the general practice ought to be for both medical man and pharmaceutist to confine himself to his own proper vocation. This I hold to be a desirable consummation, but it is not by legislation that it is to be effected. It then will be asked, How and when ? I answer, by force of public opinion, and in course of time. But how is public opinion to be influenced ? I reply, by self-reform on the part both of practitioners and pharmaceutists. By the former, on the one hand, consenting, as a general rule, to abandon trading in drugs, and teaching the public to value them for their medical sagacity or operative dexterity; by the latter on the other hand resisting the temptation to become medical advisers, and teaching the public to value them for their knowledge in selecting, and skill in preparing the medicines which they require—by each, in short, doing his own proper business, and doing it well. It may be said, that these remarks apply more to the medical profession than to you, and that I am not addressing an assembly of general practitioners. If I were in a position to do so, I should use the same language to them, but as in order to accomplish all this both parties must join in the work, I take this opportunity of calling upon you to do your part. Make every exertion that you can to extend your own knowledge, to cultivate your own science and improve your own art. The public will always eventually go where their wants will be best supplied, and the more they have access to good Pharmaceutical establishments, the more they will prefer those medical men who limit themselves to prescribing medicine, and send their patients to you to get it. I wish that my brethren in England would adopt this view. I seek to throw no impediment in the way of the practitioner in remote country districts being both physician and pharmacopolist; but in the large towns, where there is business for a good Pharmaceutist, there is no excuse for continuing this practice. If it were abandoned by the great body of our general practitioners, it would, by freeing the medical man from the physic-giving bias which it unconsciously communicates to him, lead to a more correct appreciation of therapeutics, and a more scientific practice of medicine; it would, on the other hand, by holding out substantial inducements, lead the Pharmaceutist to make still greater exertions in cultivating the sciences which bear so importantly on his art—physic and pharmacy would alike be benefited. It has often been said that much might be done towards that, if the Apothecaries' Act of 1815 were repealed. There are plenty of reasons, to my mind, why it were well if this piece of legislation were blotted from the statute-book; but its repeal would not accomplish what I desiderate, if it merely permitted Scotsmen to do in England what too many Englishmen do there already. I do not wish to hunt it down merely because it is an unjustifiable monopoly. I wish to see the downfal of the fabric of which it is one of the chief props. Whether the repeal of the Apothecaries' Act lead to the abandonment of the system of drug selling by medical men, or the decay of this system lead to the Act becoming a dead letter, is the

same thing to me; provided the result can be come at I care not at which end the change begins, but as we have been trying in vain for a quarter of a century to reform the practice by repealing the Act, it would be better now to try whether we could not practically repeal the Act by reforming the practice. Till this is done, I am persuaded that neither physic nor pharmacy will have their proper status in Britain. Let it not be said that this is an Utopian scheme which will never work—that it may be very well in theory but would not do in practice; that it would impoverish medical men and upset a system to which they have become habituated by long practice. I maintain that it is no piece of mere theory, but that it has been tried and found to work well. I have reason to believe, that in not a few instances in England, general practitioners have, without any detriment to their worldly interests, which every prudent man is bound to consider, been content to seek their remuneration for their advice and assistance alone, and have abandoned the degrading practice of making money by the sale of mixtures and pills at a fictitious and exorbitant price. But if any one wishes an example of a fair trial of the practice which I am advocating, let him look at our own city, and see how things stand now, compared to what they did, not thirty years ago. At that time every practitioner had a surgery in his house, and dispensed his own medicines by the hands of his apprentices. There were comparatively few pharmaceutical establishments in our whole city, there was little to encourage and nothing to stimulate them. But medical men came to find that the dispensing of drugs was troublesome to superintend—often perplexing to execute amidst the distractions of practice, and that it was better done by men who would devote their whole time and attention to it. The home dispensing system has, as you know, been universally abandoned; and now, in every quarter of the town, we have, I should say, five admirable pharmaceutical establishments for every one druggist's shop which then existed. Has any one suffered by this? Certainly not the public; for they are tenfold better supplied with medicines than they have been. Has the medical profession suffered? No; for although perhaps few of us make fortunes in this city, we practise our profession with at least as much comfort, we enjoy at least as good a social status, and, I hope, succeed in relieving the ailments and commanding the confidence of our patients, at least as well as our brethren in places where the old system is in full force. Has Pharmacy in Edinburgh not profited by this? Let other places answer whether it is not the fact that to Edinburgh Pharmaceutists they are largely indebted for their supplies of some of the most precious means for the relief of human suffering. It may be said that from an Edinburgh speaker to an Edinburgh audience this is merely self-praise—that I am availing myself rather freely of the proverb, *licet apud Athenas Athenienses laudare.* It is not so. I do not praise the Athenian men but only the Athenian system. It is in it that the better condition of our profession lies, and other places, if they would make trial of it, would like us experience its advantages. But as we have made some little improvement, let us try to extend it. Whilst we strive to improve and extend medicine as a science, do you the same for pharmacy. Labour also to improve it as a practical art, and freely use these meetings to impart your knowledge to others. I know that there are many of you who deplore that the auxiliary sciences were not so carefully studied in your younger days as you now know they ought to be, and as you wish that they had been; and your business is now too engrossing to allow you to become students again. If you feel any such want in yourselves, see that it is not a want in your successors. Encourage your junior assistants and apprentices to study closely, give them as much opportunity, as you can, to attend lectures, afford them, if possible, a nook in the laboratory to make experiments for themselves, and when leisure permits examine them from time to time to see what progress they are making. Thus, whether you yourselves are able or not to contribute directly to the progress of pharmaceutical science, you will at least have the satisfaction of helping to train up a generation of successors who may achieve that which was denied to you.

"I beg leave shortly to address myself now to those younger members of the profession of whom I have just been speaking hopefully. If you are to realize these hopes, work for it, now or never. I need say nothing about your course of study, for that is laid down for you by the Society in compliance with the Act of Parliament. I need say nothing about the necessity for following the courses of lectures with regularity and attention, because common sense tells you that unless this is done you had better remain at home. I have no fear of your obtaining, under the superinten-

dence of your seniors and in the daily execution of your duties, a good knowledge of the physical properties of drugs, and skill in the ordinary work of the laboratory; but you must strive to do more than this—it is not in this direction that improvements in British Pharmacy are most to be looked for. I do not believe that in any country in the world is the purely practical part of your profession better known or better performed than in Britain. It is in its scientific aspects that British Pharmacy contrasts most disadvantageously with that of France and Germany, and it is as a science that you must endeavour to elevate and extend it. Let me beg of you, therefore, to pay special attention to those branches of science which bear upon it. Botany is one of your prescribed courses of instruction—see that you get rid of the notion that Botany means learning the names of plants. This is an exercise of memory, and no part of the science of botany. Study vegetable anatomy and morphology, and when you do study plants, look rather towards making an acquaintance with the general characters of orders and tribes, than with individual species. With good general knowledge a species is easily determined—you will never know species, except in a loose empirical way, without possessing a good general knowledge of botany. This, which will form an agreeable occupation for leisure hours, will in many instances prove a valuable knowledge to you. The now extended commerce of our country brings us into contact with many unknown vegetable products. You may often have occasion to meet with these in the course of your future commercial transactions, and you will be doing science a service, perhaps paving the way for the introduction of some new and valuable remedy, or removing error as to the true source of one already known, by being able to trace out its botanical history.

"Chemistry also you are required to study. When you have completed your attendance on lectures, and have mastered the general principles of chemical science —and those you must master at the outset if you ever expect to know anything of Chemistry at all—continue to prosecute the science for yourselves. I have requested your seniors to aid you in this, so far as they can, by permitting you to make experiments; regard this as an indulgence, and strive to merit it by devoted attention to the ordinary business of the establishment. Do not suppose that you cannot cultivate chemistry without an expensive apparatus, and a laboratory regularly arranged for scientific research. A very moderate amount of outfit will enable you to work for yourselves with much success and advantage. You may thus easily go through—or, if you have already done so in a chemical school, repeat —a course at least of qualitative analysis, by the help of Fresenius or some such text-book. When you have done this, I recommend you to try some of the known processes of organic chemistry, such as the extraction of narcotine from the residue of the laudanum bottle, the preparation of piperine, salicine, or some of those products which may be obtained without the employment of expensive materials. Exercises such as this may be performed without interfering with your ordinary duties, and I am sure that no master will grudge your devoting part of a slack day to this, if you show yourselves anxious and zealous in that which is your proper business. When you have acquired sufficient experience in conducting scientific operations, you may with propriety take up some less known subject for investigation; but beware of attempting original research too soon. Many a young chemist, with more ambition than discretion, fancies that he is making discoveries, when he is only making confusion, from not knowing what he is about. A directly useful and not less improving exercise for you, is to go over the pharmacopœia tests, such as they are, for determining the purity of medicines. They are put there as guides for the Pharmaceutist, and you ought to make yourselves acquainted, not only with the performance, but with the theory of them. I recommend you also to endeavour, if possible, to make yourselves familiar with the use of the microscope. Every day this important instrument is receiving more extended applications. It has not yet been enough applied to the investigation of pharmaceutical products, especially as regards impurities and adulterations. I do not forget that it is an expensive piece of apparatus, although a good working microscope may now be had at a comparatively small price; but in a large town like this, if the procuring of one for yourselves is beyond your means, you may readily get the loan of one—or two or three of you might unite to purchase one for your mutual instruction and benefit. These remarks I offer to you as junior assistants and apprentices, not so much for the sake of urging you specially to do what I have recommended, as for illustrating what I

have already alluded to—the importance of your adding to a practical knowledge of your business an acquaintance with its scientific bearings, and of thus aiding to elevate and improve the future condition of British Pharmacy.

"I must not, however, forget, that one of the objects which I proposed to myself in this address was, to bring under the notice of the Pharmaceutical Society some subjects which you, as practical men, are most competent to answer, and which may form useful matter for discussion at some of your meetings.

"Let me urge upon you the importance of your doing what you can to secure for Britain a national Pharmacopœia, instead of the three which belong to the several divisions of the United Kingdom. This has long been a desideratum to me. So far back as 1839 I ventured to write as follows:—

"'We trust, however, that the importance of an Imperial Pharmacopœia will not be lost sight of, and that this desirable object may ere long be attained, but we are afraid that in present circumstances we cannot expect this to be done spontaneously by the Colleges, and we must look to the Legislature for its accomplishment. It would surely be well worth the attention of the Government to have this brought about. In the construction of an Imperial Pharmacopœia, we should have a large amount of pharmaceutical and practical skill brought to bear on one common work, instead of having it dispersed over three, and we should not, as at present, have in different parts of the kingdom the same medicine designated by different names, the same substance of different strengths, and a multiplicity of processes for the same preparation, all professing to be equally good—a state of matters which is embarrassing alike to the student, the practitioner, and the apothecary. Were this accomplished, one very important step would be taken towards improving that department of our profession which relates to medicinal substances. We should have the nomenclature less confused, and the medicines more uniform, and thus, on which ever side of the Tweed a prescription might be written, it would be more readily understood, and the medicine would be more certain of possessing the same properties, whether it were dispensed in London or Edinburgh. It is likewise probable, that by conjoining the talent of London, Edinburgh, and Dublin, we should have better processes for many of the preparations, and medicines would thus ultimately be procured both better and cheaper.'

"I do not propose a national Pharmacopœia as a subject for discussion here, unless there should be, which I hardly anticipate, any difference of opinion as to the expediency of having one instead of three in Britain. But I notice it as a most legitimate subject for exertion on your part. In a draft medical reform bill which was put forth last year, a clause was inserted to give powers to a central medical council to procure the construction of a national Pharmacopœia. If we wait till a medical reform bill is carried, I apprehend we shall see no national Pharmacopœia till the Greek calends. It appears to me that this ought to form the subject of a short separate bill; it will cost a little money, and the nation, which will benefit by it, ought to pay for it. I offer it as a suggestion whether you ought not to memorialize the Minister of Health to take up this subject, and ask him to introduce a bill providing for a commission which shall embrace representatives from the various Colleges of Physicians, and from the Pharmaceutists of England, Scotland, and Ireland. I rejoice to know that your parent Society has already established a Pharmacopœia Committee. I hope that they will persevere in their labours, and that the body of information which they are now collecting, will clear the way for a more easy arrangement of the details of a national Pharmacopœia.

"I invite your attention also to the subject of the adulteration of drugs. I am convinced that a great deal of most erroneous opinion is abroad on this subject. That fraudulent adulterations are to be met with, no one can deny, and you cannot do a greater service, both to yourselves and the public, than by laying before your meetings any instances of the kind which may come under your notice. I am not going at present to enter upon a discussion as to how far legislation may be called for to put down these obnoxious practices, but I am sure of this, that some good has already been done by Mr. Scholefield's Committee of the House of Commons, in directing attention to the subject; and the more that correct and positive information is laid before the profession regarding adulteration, the greater will be the facility of dealing with them. Much has already been done towards exposing and checking these practices since the Pharmaceutists of Britain began to cultivate their profession more scientifically, and diffuse knowledge by means of their Journal; and

every advance which, as a body, you make in science, will place you more and more strongly in a position to put down practices which, I am sure, you all feel to be no less opprobrious than injurious to your own interests. Might it not be a good plan to have an authorized monthly publication of the current prices of pure drugs, so that the less-informed pharmaceutist in remote districts might know, when drugs were offered below their real value, that they were either adulterated or not honestly come by ?

"It was my intention to have directed your attention to several subjects of a practical nature, but I have already trespassed so unjustifiably upon your time that I must hasten to a conclusion, and content myself with naming only two—viz., the preparation of infusions and tinctures.

"The question of concentrated infusions has already received much discussion both at the Metropolitan and Provincial Meetings of the Pharmaceutical Society, but I cannot say that the information which has been already eliminated has been altogether satisfactory. You had the subject brought before you last April by the gentleman who now occupies your chair, and you had, I believe, some discussion respecting it. Unfortunately, in regard to infusions, two separate questions have been mixed up together, which ought to be kept distinct. One is, whether or not a druggist is entitled to use a concentrated infusion, diluted to the proper extent, when an infusion is ordered in a prescription. Now upon this point I have no doubt, that unless the Druggist can obtain the sanction of the Physician to do otherwise, his duty, as a general rule, is to keep to the formula of the Pharmacopœia. I would have you, however, whenever you can, ask Physicians to employ these concentrated infusions, that their value may be more fairly tested. The other question, which is much more important, and which I wish you to answer, is whether these are really eligible preparations pharmaceutically. Now upon this point we have had plenty of opinions, but too few facts. From what experience I have had of these concentrated infusions, I am inclined to look favourably upon them as medicines. Upon the purely pharmaceutical part of the question I offer no opinion, but I ask you to give me some enlightenment, and I say regretfully in the words of Mr. Gardner, 'As yet none of the Edinburgh Members have taken up the matter, and it is to be regretted that neither successful nor unsuccessful experimenters have contributed the results of their labours.' May I beg of you now to take the hint.

"I would also commend to your attention the subject of the preparation of tinctures. I should like from you some experimental reply to the following questions : Is percolation superior as a general method to the old process by maceration—or if not generally advantageous, is it so in some, and in what, special instances? Is it equally productive as regards both quantity and quality, or the reverse? Is its comparative expeditiousness enough to recommend it—or may it not in some instances be better to adopt the method of Cadet—which consists in macerating the solids for some hours in twice their weight of spirit, expressing strongly, making up the requisite quantity with more spirit, and filtering? It would of course be out of place to go into detail as to how such an inquiry ought to be conducted. It is carefully ascertained facts that we require—it is only a practical pharmaceutist that can take up this subject with advantage, but I am sure that important results might be obtained, with very little addition to the labour of doing that which every one of you must, from the requirements of his business, be doing every day. Might it not be worth while when any special subject, particularly of a practical nature, comes before you, to adopt the plan which works so well on the Continent and has been found to answer by the Royal Scottish Society of Arts, of referring it to a committee, who shall try it, and report upon it ?

"I must not, however, detain you longer than to apologize for the imperfections, and, I fear, the tediousness of this address. I have desired to make it suggestive, and have brought before you one or two subjects for scientific inquiry. They are merely those which have first presented themselves to my mind, and I am sure, that with a little more time for reflection and reference to documents, I might have noticed others of equal or greater importance. Many of these, however, will suggest themselves to you ; and, as practical men, you must be conversant with many of which I am necessarily unaware. Let me express a hope that no one will be deterred from bringing forward communications because he feels that they may be deemed unimportant, or because they may not contain much that is absolutely new. In meetings such as yours, which are but of recent institution, and, as it were, only

feeling their way towards usefulness, no practical subject is unimportant, and novelty is not essential to utility. Even if a communication do not directly contribute much to science, it may do good by exciting discussion, and at these meetings discussion, free in its scope, and temperate in its spirit, is sure to be profitable. Above all, bring together stores of facts—no matter how small in themselves, they will make a goodly sum when collected. Facts are the pence of which the pounds of science are made up.

"In conclusion, let me thank you for having listened to me so long and so patiently. It will be to me a great satisfaction if the session which you have done me the honour to permit me to inaugurate, should, by your exertions, prove eminently successful and profitable."

These remarks were listened to with attention, and were much applauded. A vote of thanks was proposed by Mr. James Robertson to Dr. Douglas Maclagan for his very excellent Address, seconded by Mr. J. F. Macfarlan, and carried unanimously.

A communication was then made by Dr. S. Macadam on Sulphuric Acid, with an especial reference to recent Improvements in its Manufacture.

A vote of thanks was proposed by Mr. Baildon to Dr. Macadam, which, after a few remarks from Dr. D. Maclagan and Mr. Macfarlan, was carried with acclamation.

After examining some new books and specimens upon the table, especially samples of Chloroform and Æther made from Methylated Spirit, the meeting separated.

Edinburgh, 30th October, 1855.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

Royal Institution, Thursday, 25th October.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

Mr. S. Banner was elected a Member of the Association.

The Secretary announced Donations to the Library and Museum from Messrs. J. H. Johnson; H. S. Evans; T. C. Archer; J. H. and S. Johnson; McFarlane and Co., Edinburgh; N. Mercer; and Barron and Harvey, London.

A paper by Mr. H. S. Evans, F.C.S., was read, upon the characteristics and properties of the following specimens, which had been presented to the Museum by Messrs. Evans, Sons, and Co.:—Inga, or False Cassia Fistula; Indian Bdellium, or False Myrrh; Undulated, or False Ipecacuanha; Musk Pod, falsely packed; American Isinglass; Hyraceum; Jamaica (?) Sarsaparilla; Sarzæ, from West Coast, Central America; Monkey Cups; Brazilian Leguminous Fruit; Sapindus aponaria; Myrospermum of Sonsonata; Simabra Cedron.

The thanks of the Meeting were passed to Mr. Evans for his interesting communication.

Mr. Abraham placed on the table specimens of Extract of Senna prepared in vacuo, and the metal Aluminium.

Mr. Mercer exhibited a spoon, upon the bowl of which aluminium had been deposited by the battery; and he also showed a specimen of artificial stone, composed of a mixture of silicate of potash and sand, and which could be moulded to any form or shape.

Thursday, 8th November.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

Messrs. R. Mullock, D. Mackinlay, G. Barber, and J. Palin, were elected Members of the Association.

The Secretary announced Donations to the Museum from Messrs. J. D. Walker; H. S. Alpass; J. H. and S. Johnson; G. Turner; R. Sumner and Co.; R. Clay; W. H. Samuel, and T. C. Archer.

Some new French Crucibles were shown to the Members by Mr. Samuel.

Mr. MERCER exhibited specimens of the Patent Iron Slag for building and artistic purposes, made from the refuse of iron smelting furnaces.

T. C. ARCHER, Esq., delivered a Lecture on

THE USEFUL PRODUCTS OF THE NATURAL ORDER PALMACEÆ,

of which the following is an abstract:—

The natural order Palmaceæ comprises some of the most beautiful plants in the world, and is not only remarkable for the majestic forms of its species, and their position at the head of the endogenous division of the vegetable kingdom, but also for the great value of their products to the human family. It is this latest quality, and not the botanical history of the order, which formed the subject of Mr. Archer's lecture. He based his remarks on the system proposed by the late Mr. William Griffiths, in his work on *The Palms of British India*, though he would have preferred the arrangement of Martius, had he been able to procure his work. The first division is that of the *Calaminæ*, which comprises several most useful genera. *Zalacca*, an Indian genus, yields the beautiful sticks called Malacca canes; these are the thin stems of the Z. edulis; when first gathered, they are of a light yellow colour, and in order to produce the much admired brown colour, they are smoked, by being suspended over wood fires.

Calamus is another Indian genus, several species of which yield useful products. The most valuable is the long slender stem of the C. rotang, or the ratten cane of commerce, so extensively used in this country for chair bottoms, &c. It is applied to an amazing number of useful purposes in India and China, not the least important of which is that of tying up packages for transport to distant countries, such bandages having an advantage which none of the ordinary fibrous materials possess, being almost imperishable, and consequently not rotted by exposure to damp in the vessel's hold. This arises from the large quantity of oil which these plants secrete and deposit on the outside of their stems. Dragon's blood is yielded by *Calamus Draco*, and perhaps other species. It is a peculiar resinous secretion of the fruit.

Many palms of this division yield sago. This farina is prepared from the trunks of these palms, which are of a gigantic statue, and as much as from 500 to 800 pounds are sometimes yielded by one tree.

Naphia is a genus of magnificent South American palms, luxuriating in the rich plains of the Amazon. One species, N. tædigera, is a glorious object, the enormous plume of primate feathers rising gracefully, as feathers from the top of its straight cylindrical stem is often from sixty to seventy feet in height. It is a great blessing to the natives, who make from the hard outer portion of the petioles baskets, window blinds, &c. From the softer internal portion they make shutters, doors, boxes, and almost every other domestic article, which in other countries would be made of harder wood. The entomologists who explore its habitat are glad to get the pith for their insect boxes, in which it takes the place of cork.

Coryphinæ, the second division, is typified by the genus *Corypha*, which yields numerous valuable materials. The genus Chamærops is the only genus which extends so far north as Europe and North America; in the former continent it is represented by C. Humilis, which grows in the extreme south of Europe, and in the latter by C. Palmetto, is found in lat. 34°—36°. The next genus, Phœnix, is one of the most useful of the order; P. dactylifera, is the well known date-bearing palm, the fruit of which is the chief food of many tribes of Asia and Africa. It has been cultivated from a very early period, and rewards the careful cultivator with improved varieties. In a letter addressed to Lord Palmerston by Dr. Richardson, on the dates of Fezzan, he states, that nineteen-twentieths of the population of Fezzan live on dates during nine months of the year. P. Sylvestus, is tapped for its juice, which is either fermented into palm wine or toddy, or else it is boiled for its sugar; of the latter article immense quantities are not only used in India, but also exported to this country. Division Aricinæ. The genus Areca belongs to India, and is of great importance, owing to the extraordinary use of the nut of the A. catechu, in almost all parts of India, as a narcotic and excitant of the salinary glands.

Division *Cocoinæ*.—Cocos nucifera, the cocoa-nut palm, is an object of interest even to the inhabitants of Europe as well as the tropics. It yields us a valuable vegetable fat, the importance of which is daily increasing in the manufacture of candles and soap. For its use in making candles we are chiefly indebted to Mr.

Wilson, the spirited manager of Price's Patent Candle Company. This company, the largest of the kind in the world, is making an enormous amount of goods for the island of Ceylon, where they have large plantations of the cocoa-nut palm—the produce of each palm is enormous. An acre will yield about 4000 nuts per annum if well cultivated; if intended for oil, the kernels are extracted and are ground into a pasty mass, called *coperah*, this is submitted to the necessary pressure in the oil mills, and yields for every 100 nuts twenty pounds of the cocoa fat or oil, or 800 pounds per acre. The marc or oil-cake is valuable as food for cattle, besides which one of the most useful of our fibrous materials is derived from the husks. The genus Attalea is of great importance to European commerce—from one species is obtained the common Piassava of commerce, and the coquilla nut, so highly prized by turners for making a variety of small ornamental turnings. Another species, A. cahune, produces the cahune nut of British Honduras, which has become a matter of some interest, in consequence of several importations having been received for experiments in the production of an oil which its kernels yield in great abundance, but the difficulty of extracting the kernel neutralizes its value. The African genus Elais closes the list of the division cacoinæ, and it is unsurpassed in value by any of the Palmaceæ. E. Guineensis yields the valuable palm oil of commerce, one of the staple imports of Liverpool.

The fruit is borne upon an immense thyme-like spadix, each drupe is pear-shaped, and somewhat less than a walnut, having a soft pulpy merocarp of a light orange colour, from which the oil is yielded abundantly when the fruit is exposed in heaps to the sun in the manner employed by the olive-growers. It is quite startling if we begin to think of the vast extent to which this tree must be cultivated, for each tree does not yield more than ten pounds of oil, and the quantity annually imported into England alone is nearly 30,000 tons, which would require 6,720,000 trees ; it is probable, however, that several crops are yielded in one year. Palm oil yields by distillation with acid a valuable material called Palmitic Acid, and this, mixed with the neutral fat of the cocoa-nut, is found to form the best known composition for candles, and is, in fact, the material of Price's candles. It is also extensively used in the manufacture of soap, and constitutes a large proportion of the grease compositions used for the axles of railway carriages. The so-called vegetable ivory, which is the hard albuminous kernel of a very large palm called the *Phytilephos macrocarpa*, and does not range under any of the preceding divisions. Its magnificent primated leaves are from thirty to forty feet in height, and it bears immense clusters of its curious fruit at their base. When immature, this fruit yields a delicious liquid resembling a custard in richness and delicacy of flavour, but when ripe it becomes exceedingly hard, and, like ivory, it can be carved into a variety of ornaments.

Mr. Archer illustrated his lecture by a large and valuable collection of specimens, amongst which were a complete set of the products obtained from the cocoa nut and palm oils, by Price's Patent Candle Company.

The thanks of the meeting were given to Mr. Archer for his interesting and instructive lecture.

The President said he was glad to hear that Mr. Hatcher, Chemist to Price's Candle Company, at their Bromborough Pool Works, was present, and he was sure the meeting would feel gratified if he would favour them with an outline of the manufacture carried on at those works.

Mr. Hatcher remarked that the general outline of the manufacture carried on by Price's Patent Candle Company, at Bromborough Pool Works, is as follows :— The crude palm oil is melted out of the casks in which it has been imported, and allowed to remain in a melted state in large tanks until the mechanical impurities have settled to the bottom. The clean oil is then pumped into close vessels, where it is heated and exposed to the action of sulphuric acid. The glycerine is thus separated from the oil, and the colouring matter and impurities are carbonized and partly rendered insoluble. The oil, which has now a greyish-brown shade, is washed to free it from the acid. From the washed product distillation now separates the mixed fatty acids (palmitic and palm-oleic acids) as a white crystalline fat, while the residuum in the still is converted into a fine hard pitch. This pitch is fit for any of the purposes to which ordinary pitch is applicable. The mixed fatty acids may be made directly into candles, or they may be separated by hydraulic pressure, aided, if necessary, by heat. The effect of this process is to remove from the mass the liquid part (oleic acid), which is, after purification, fit for burning in lamps and

other purposes. The hard cake left in the presses is nearly pure palmitic acid—it is brilliantly white, not at all greasy, and has a melting point of 135° to 138°. It is fit for the manufacture of the finest candles, either alone or in admixture with the stearine of the cocoa-nut oil.

The Company employ 2000 hands, and have, during part of the winter, manufactured from £15,000 to £20,000 worth of candles weekly.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

The second Evening Meeting of this Society for the present Session was held on Friday, Nov. 2, Mr. Woolley, President, in the chair.

The Chairman commenced the business of the Meeting by saying, that he thought it would be better to begin the Evening meetings by discussing any matters of interest connected with the trade that might have occurred to any of the Members.

He had brought specimens of Methylated Spirit, and "Finish," together with samples of sweet Spirit of Nitre, and Sulphuric Ether, which he had prepared from the latter. With regard to Methylated Spirit, there was considerable difficulty in obtaining it for general use owing to the stringency of the Excise regulations respecting its sale. It was not easy for a person to procure the guarantee of two householders that he would only use it for the purpose stated; and few people liked to involve others in such a responsibility; besides, the article could only be sold by persons authorized to mix it, and by them in quantities not less than ten gallons, so that under the present regulations it was not accessible either to the Pharmaceutist or the general public.

The Board of Inland Revenue, however, are anxious to interpret the Act as liberally as possible, and do not wish to throw any unnecessary obstructions in the way of its legitimate use, and allow the unrestricted sale of a mixture under the name of "Finish," which contains three ounces shell lac to the gallon of Methylated spirit, and for the use of hatters, French polishers, and varnish makers, is quite as good as the spirit, and will, doubtless, come into extensive use in those trades, as it will not affect the eyes in the manner naphtha does.

A conversation on the subject followed, in the course of which it was stated by Mr. J. A. White, that some polishers objected to the "Finish," saying that it made the polish "soft," and that they preferred naphtha.

The question was discussed as to whether the Excise would permit "Finish" to be made use of in preparing spirit of nitre, ether, and similar substances. Mr. W. S. Brown said, he did not think the Excise would interfere with the applications of the article, provided it was not made potable. Mr. Woolley said he had written to the Chairman of the Board stating what he had done, and asking if such an application of it were allowed, but had as yet received no answer to his note.* He thought that in Scotland the manufacturing Chemists were acting on the idea that it was permitted, as he had received a price-current from one of them, in which chloroform made from it was mentioned.

The spirit of nitre was a fair sample, and if permitted, will doubtless be made to a considerable extent for sale in certain localities.

The sulphuric ether appeared to have somewhat the flavour of acetic ether, but would probably answer every purpose in scientific or manufacturing Chemistry, for which sulphuric ether is required, and would doubtless come into general use in the preparation of collodion for photographic purposes.

It is much to be hoped that the authorities will allow *this kind* of ether to be made from the methylated spirit, as it cannot by any means be converted into a potable

---

* Mr. Woolley has since received from the Board of Inland Revenue a reply to his note, from which the following is an extract :—"The conditions under which a person is authorized to receive methylated spirit, including the requirement of a bond, have been framed for the purpose of causing the least possible inconvenience compatible with ensuring that the spirit shall not be used for improper purposes.

"The Board must decidedly decline to sanction the recovery of the spirit from 'finish' by a person not authorized to make or receive methylated spirit."

This, it will be seen, does not decide the question whether it is permitted to use "finish" in the manufacture of *ethers*.

beverage, whilst cheap ether would be an invaluable acquisition both to the scientific and manufacturing Chemist.

Mr. Woolley introduced Mr. Grindon, lecturer on botany to the Pine Street Medical School, who had brought some specimens of plants, whose properties and uses he would explain to the Members.

Mr. GRINDON said, he had brought a collection of specimens illustrating the different kinds of grain used as food by man.

There are seven different kinds of grain cultivated for food, all produced by the natural family of the grasses. These are maize, or Indian corn; wheat, barley, oats, rye, rice, and millet.

In every country there is one particular kind, which is "*the corn*" of the country; thus, in England, a farmer speaking of the state of his "corn" crop, would be referring to his wheat, whilst in Scotland the term would be applied to oats or barley. "Corn" is an old Saxon term for fruit, and hence "ak corn," or acorn, the *fruit* of the oak.

Some plants have the male and female organs in separate flowers, but on the same plant, and are called monæcious: maize is one of these, and the wonderful provision for the fertilization of the seed in this class of plants is illustrated in a remarkable manner by the arrangement of its flowers. The male flowers are in a cluster at the top of the plant, the female flowers at the side, appearing like a little cluster of eggs, and if the plant be shaken when in blossom a cloud of dust falls, which is the pollen. The male flowers are always *above* the female in monæcious plants. The willow, hazel, and poplar, blossom early in the spring, before the leaves are so far expanded as to present any obstacle to the fall of the pollen.

Indian corn has a great variety of colours, but the colour lies only in the outer skin, and is merely a variety, not a different species. It is possible to grow maize in this country, but it does not ripen well, and is not nearly so good as the American; it requires a warmer climate and more southern latitude.

Wheat is the grain chiefly used for food in this country, of which there are two principal species cultivated: the winter, or beardless, and the summer, or bearded wheat; the latter is principally grown in the southern parts of the country, it requiring a warmer climate than the northern parts possess.

Wheat is the most extensively diffused of all grain, but as we approach the equator it requires a greater elevation.

Barley is the next to wheat in the extent of cultivation.

Rye forms the principal part of the food of the inhabitants of some parts of Europe, and the black bread we hear spoken of with so much disgust, owes its colour to the rye flour from which it is made.

Wheat, barley, and rye have their grains all clustered together into one spike. Oats, rice, and millet in a panicle. Rice forms almost the entire food of several millions of people, but is only cultivated in tropical countries. It requires some particular conditions of soil and climate, which are only to be found in those regions. Many attempts have been made in hot-houses in England to bring it to maturity, but without success.

Millet is extensively cultivated in the East and in the West India Islands.

Mr. Grindon handed round an ear of wheat, raised from the seed of a plant, produced by a grain of wheat found in the hand of a mummy, which was unrolled two or three years ago; and is a very interesting specimen, as showing the extraordinary length of time seeds will retain their germinating power, if protected from the action of air and moisture.

The specimens of Indian corn were remarkable for their size and the regularity of the seed rows. Some very fine specimens of millet were also shown, exhibiting the remarkable fertility of the plant.

The Chairman said he was quite sure the Members present were exceedingly obliged to Mr. Grindon for his very interesting lecture, and hoped that if the Society were favoured with another from him, all the Members would be present.

ORIGINAL AND EXTRACTED ARTICLES.

NOTES UPON THE MATERIA MEDICA OF THE PARIS EXHIBITION, 1855.

INDIA.

British India has contributed a vast and rich collection of raw products, derived from the animal, vegetable and mineral kingdoms. It is, however, to those which bear upon medicine that our attention has been chiefly confined; and here we must observe that, owing to the defective arrangement of the collection, the want of suitable bottles for the display of specimens, and the absence of intelligible labels and a comprehensive catalogue, nothing like a thorough examination could be accomplished. The most that we have been able to do, has been to note a few of the products that struck us as more deserving attention.

From Bombay a collection of more than 100 specimens of the drugs occurring in the bazaars of Scinde, has been contributed by the Hon. East India Company; but few of them are accessible for examination, as they remain unopened in the bags in which they were imported.

Among other contributions in this section, we have noticed Cloves, Cardamoms and Betel-nut—some covered with gold-leaf, others with silver, used as condiments to the food; Gamboge of coarse quality, in flattened circular cakes, and Opium from Malwa; several drugs from Aden, at the mouth of the Red Sea; Dragon's Blood in tears, from the island of Socotra (is it the produce of a *Dracæna?*); Sarcocolla and Assafœtida—the latter a curious variety, perhaps afforded by a different plant from that yielding the ordinary drug of commerce.

Besides these, we may mention a curious box of Surgical Instruments of rude workmanship, manufactured in Scinde, containing copper couching needles, cupping instruments, tooth fumigator "to expel insects from the teeth," lancets, forceps, scissors, &c.

From Canara a numerous collection of specimens of interesting raw products has been contributed, among which we notice Dammar Resin; Piney Tallow, produce of *Vateria Indica* Gærtn.; Cassia Buds, or rather *Seeds*, marked as the produce of *Laurus Cinnamomum*, but very deficient in aroma; Wild Nutmegs, small and round; besides a large number of oils, essential and fixed. Another product we may mention is the oleo-resin termed *Wood Oil*, determined by Dr. H. F. C. Cleghorn to be afforded by *Dipterocarpus turbinatus* Gærtn. or *D. lævis* Hamilt.* both species yielding a balsamic fluid, called by the natives *Gurjun*, and used by them for the preservation of timber, which it effects very imperfectly. It may be had in considerable quantity and at a low price.†

Fine masses of Piney Resin, the produce of *Vateria Indica* Gærtn., from the forests of Cochin and Malabar; Kino of *Terminalia tomentosa*, W. et A., from Cochin; an odoriferous resin, called *Mutti Pal*, afforded by a species of *Ailanthus*, from Travancore and Cochin; Resin of the *Saul* tree, *Shorea robusta* Gærtn.; Gamboge of *Garcinia pictoria* Roxb., from Mysore and Wynaad, are a few other substances we have noted.

Contributed through Calcutta, we find some interesting products from Tenasserim and Martaban, of which we may enumerate *Orpiment*, occasionally imported thence into the London market, *Selenite* and *Alum* in the mineral kingdom. Among the vegetable products, No. 6585,‡ Crude Camphor; No. 6582, Purified Camphor; No. 7040, Arrowroot; Nos. 6586, 7038, two samples

---

* *Proceedings of the Madras Central Committee for the Universal Exposition of Industry and Art, held in Paris in* 1855. Madras, 1854, 5, fol.

† See Roxburgh, *Flora Indica* (ed. Carey) vol. ii., p. 613; also O'Shaughnessy, *Bengal Dispensatory*, p. 222.

‡ These numbers are those attached to the specimens themselves.

of Sago; No. 7536, Vegetable Tallow in small cakes, hard and white, and smelling like cheese; Nos. 7246, 7, a substance called *Burmese Rosin;* No. 6594, Nutmegs; No. 6571, Cardamom *Seeds*, and No. 7034, the same from Mergui; No. 6976, a very thick bark, having an odour like sassafras; No. 7272, Gutta Percha; and No. 6587, Unbleached Ginger. Resin of *Liquidambar Altingiana* Blum., procurable in the bazaars of Mergui, Tavoy, &c., and used by the natives in medicine and perfumery, is also among the contributions.

From the Himalayas we find the aromatic little capsules of *Zanthoxylon hostile* Wall. having a flavour of Pellitory of Spain and like it, sometimes chewed for the alleviation of tooth-ache, also used in the North of India for intoxicating fish.* Kakrasingee Galls (*Rhus Kakrasingee* Royle) large excrescences, resembling the galls of *Pistacia Terebinthus; Rusot*, the extract of *Berberis Lycium* Royle; from Assam the resin of *Canarium strictum* Roxb., *Dhoona*, the resin of a *Dipterocarpus*, resembling the best Dammar; and from Upper Assam, specimens of Souchong Tea, prepared both from the indigenous and from the China tea-plant.

A large specimen of Tabasheer (No. 7057), gum of *Acacia Farnesiana* Willd., Long Pepper, Star Aniseed, *Tez-path* (No. 6526) or *Tij-pat* the *Folia malabathri* of pharmacy, are marked as from Calcutta.

Some very fine Nutmegs and Mace from Singapore, including both dry and wet specimens, are contributed by T. Oxley, Esq., of that place; there are also Wild Nutmegs from Malacca, and specimens of Gamboge from Borneo.

Ceylon presents a considerable collection of native *Materia Medica*, but unfortunately neither well preserved, well arranged, or clearly labelled, so that it has been scarcely possible to submit it to a careful examination. We have however been favoured with the sight of a catalogue of the collection, printed at Colombo, from which we propose at a future time to give some extracts.

While noticing the various raw products contributed by India to the Paris Exhibition, we must not omit to mention those supplied by the Dutch possessions in the Eastern Archipelago. Of these, the more remarkable are those sent by the Society of Commerce of the Netherlands (*Nederlandsche Handel Maatschappy*) and exhibited in the *Annexe* in the form of a conspicuous trophy upwards of thirty feet high.† In this group, besides the important productions of Coffee, Sugar, Rice, Nutmegs and Hemp, occur several samples of Tea produced in Java. Then we find Cochineal, Turmeric, and Ginger, the last two not fine, Cubebs, Black and White Pepper, Long Pepper, Brown and White Sago, Benzoin, Cassia fistula, Musk Seeds (*Hibiscus Abelmoschus*), Cocculus Indicus, Java cinnamon, Oil of Cinnamon, an almost colourless fluid so labelled; *Cassia vera* bark, called *Figablas* (largely imported into London), solid oil of nutmegs, *Anthophylli*, the half-developed fruits of the clove, Round or Cluster Cardamoms, &c. There are also some good specimens of a new drug known by the somewhat barbarous name of *Penghawar Jambie*, or *Pakoe Kidang*, consisting of the lower part of the stipes of a fern growing in Sumatra, probably the *Cibotium Barometz* of J. Smith, curiously covered with a mass of fine shining moniliform hairs, used as a styptic; specimens of the rare Lopez Root, marked *Morus Indica*, N. v. E. ? once included in the *Materia Medica* of a British Pharmacopœia,‡ and still retained in that of Holland; and, lastly, a coarse, sawdust-like, slightly aromatic substance from Amboyna, marked "*Storax en larmes, qualité précieuse, introduite depuis peu en Europe*," and most questionably referred to *Styrax officinale*, L.

In addition to the products we have enumerated, there is a large collection (not exhibited by the Society of Commerce) numbering some hundreds of bottles containing samples of *Materia Medica*, &c., from Java, Sumatra, and other

---

* Royle, *Illustrations of the Bot. of the Himal. Mountains.*

† A separate catalogue of this collection is obtainable.

‡ *Pharm. Edinb.*, 1783.

islands of the Archipelago, but the whole is unarranged, and totally devoid of distinct, intelligible labels.

The French possession of Pondicherry contributes to the Exhibition a collection of Indian drugs formed by M. Lépine, *pharmacien* of that place, and presented by him to the Ecole de Pharmacie of Paris. Many of the specimens are small, and some are without labels.

Specimens of two blistering beetles, *Mylabris puncta* and *M. pustulata*, much resembling *M. Cichorii*, are exhibited by Dr. Collas, *Chirurgien principale de la Marine*, of Pondicherry.

It will not perhaps be inappropriate here also to notice some excellent specimens of Materia Medica contributed by the French Ile de la Réunion, or, as we more commonly call it, Island of Bourbon.

First then, may be mentioned some fine nutmegs in the shell, samples of mace and cloves, of cinnamon, indigenous to the island, a thick, coarse bark, coriander and fennel seed, also a very fine specimen of tamarinds in unbroken pods. Among the less common articles of Materia Medica, occur specimens of the following:—

Raventsara Leaves (*Agathophyllum aromaticum* Willd.), known as a powerful spice-like aromatic.

Patchouly Leaves, *Pogostemon Patchouly* Lepellet. (?)

Faham, the leaves and stems of *Angrœcum fragrans* Pet. Th. (*orchideæ*). Used in infusion, in phthisis, &c.

Leaves of *Cookia anisata* Desf. Uses not known to us.

Leaves of *Piper Betle* L.

Ayapana Leaves, *Eupatorium Ayapana* Vent.

Leaves of *Mussænda arcuata* Lam. (*Rubiaceæ*), *Feuilles de Ling*. Uses to us unknown.

Embaville, *Senecio Ambavilla* Pers.

Hypericum lanceolatum, called *Fleurs jaunes*.

Cascarelle, *Abrus precatorius* L.

Patte de Poule, marked *Fagara Borbonica*.

Bark of *Jossinia elliptica* De. C. (Myrtaceæ), *Bois de Nefle*.

Ecorce de Bois de Fer, *Sideroxylon cinereum* Lam.

Bois de Quivit, *Quivisia ovata* Cav. (*Meliaceæ*).

Bois jaune, *Ochrosia Borbonica* Juss. (*Cerbera Borbonica* Spr.), *Apocynaceæ*. Used as a bitter.

Bois cassant, *Psathura Borbonica* Gmel.

Vetiver, root of *Andropogon muricatus* Retz.

Patte de Lézard, rhizomes of *Polypodium phymatodes*.

Croc de Chien, roots and rhizome of *Smilax anceps* Willd.

Mauritius has contributed some samples of spices, as Cloves, Nutmegs, and Mace, some good Vanilla, Illipé Oil, from *Bassia butyracea*; but, we regret to say, no general collection of the Materia Medica produced in the island.

(*To be continued.*)

NOTES ON THE CHEMICALS IN THE PARIS UNIVERSAL EXHIBITION, 1855.

Chemical products for use in medicine or the arts, included in the tenth class of the Official Catalogue, are exhibited in great variety from several countries.

France, as might have been expected, has contributed the largest and altogether the finest collection, while next in extent and importance must be ranked the exhibitions from Austria and Prussia. Belgium, Norway and Sweden, Spain, Switzerland, and some other countries, have also furnished interesting collections of chemical products.

The chemical manufactures of England are but very imperfectly represented by a few small and inconspicuous collections, a circumstance to be regretted, though, no doubt, partly attributable to the existing laws of France, whereby the importation of chemical products, as articles of commerce, is totally prohibited.* Disinterested anxiety to maintain national repute, apart from personal gain, is not, we take it, a prevailing characteristic of English manufacturers.

That which has been sent from our country is however of creditable character, and as the glass cases devoted to English productions of this class are among the first that meet the eye of the visitor on entering the *Annexe*, we will notice their contents before passing to the foreign collections.

We would, however, observe that in commenting on the contributions from our own or other countries, the character of the articles actually exhibited has alone been taken into consideration. There is perhaps no class in which it would be easier for an exhibitor, so disposed, "to get up" an exhibition than in that devoted to chemical products. The exhibitor who habitually manufactures inferior articles, and he who does not habitually manufacture at all, may alike filch unmerited credit in this department; the former by preparing specimen samples which bear no resemblance to his ordinary products—the latter by selecting from the produce of others, and perhaps preparing for the occasion some brilliant rarities which attract observation. We repeat, therefore, that our brief remarks and criticisms have reference merely to the specimens as we found them and as they arrested our attention. Our object is simply to convey to the reader the impression which a brief but pretty careful inspection of the collection has made upon our own mind.

No. 743.—Howards and Kent, London. A good exhibition, containing fine samples of sulphate of quinine (whiter than many of the foreign samples), sulphate of cinchonine, &c., citric and tartaric acids, calcined magnesia, potassio-tartrate of soda in beautiful crystals and several other salts.

No. 520.—A. Albright, Birmingham. Magnificent sample of crystallized chlorate of potash, unsurpassed by any of the numerous specimens of other exhibitors. Bottles for common and amorphous phosphorus have been emptied to avoid the risk of accident.

No. 530.—A. and W. Hemingway, London. Samples of citrate of iron.

No. 1123.—Johnson and Matthey, London. A very interesting collection of metals: gold, silver, platinum, uranium, palladium, iridium, rhodium, and others obtained during the refining of the precious metals. A large apparatus in the form of a still for the concentration of sulphuric acid, made of platinum, with several other vessels of the same metal.

A platinum still, with several crucibles and other vessels of platinum, are exhibited by Benham and Fraud, London.

No. 538.—T. Morson and Son, London. Interesting specimens of some alkaloids and chemical preparations, including a sample of aconitine in definite crystals.

No. 545.—P. Squire, London. A small but interesting collection of chemicals, including several products of uric acid. Also several extracts and pharmaceutical preparations.

No. 742.—J. T. Davenport, London. A neatly-arranged collection, including preparations of iron, mercury, iodine, also salts of morphia and quinine, the uncrystallizable acrid principles of capsicum and ginger, called capsicine and gingerine, with several others.

In the same case are a few extracts, &c., exhibited by J. Bell and Co., London (No. 741); the samples are small.

W. De la Rue, London, has exhibited an interesting collection of eight products of cochineal.

---

* We are aware that *exhibited* goods at present prohibited by the French tariff may be admitted for consumption in France at an *ad valorem* duty of 20 per cent.

Among chemical products of purely scientific interest we are glad to observe that specimens have been exhibited of those very interesting bodies, the organic radicals and organo-metallic compounds, obtained by Dr. Frankland of Manchester.

On turning from this meager exhibition from England to the magnificent display in the same class in the French department, the contrast is very striking. Not only are the exhibitors more than four times as numerous, but in most instances the collections are larger and the samples more copious, and much more taste is evinced in the arrangement of the articles. Some exhibitors have indeed indulged in a degree of show which is quite objectionable and out of taste on such an occasion. We do not allude to the palpable absurdity of exhibiting a range of bottles of the same article, capped and labelled, and done up with the usual precision of a proprietary medicine, nor to isolated specimens of vaunted nostrums enshrined in elaborate structures of plate glass and mahogany; the matter for surprise is, that such things have been tolerated at all; but we refer to some very excellent collections displayed in a manner which evinces too much desire *ad captandum vulgus*, to be in keeping with the grave character of an international competition. Thus in one collection (No. 2417), containing very fine specimens of iodine, iodide of potassium, some bromides, &c., the glass vases in which they are exhibited are so elaborately cut and gilt that their contents are greatly obscured. In several instances, huge glass vessels are displayed filled with liquids of which a moderate sample would be quite as interesting and instructive; for instance, in one collection (No. ——), among much that is good and more that is showy, we noticed glasses, like the show-glasses of a druggist's window, containing two or more gallons apiece of sulphuric and hydrochloric acids, and similar specimens are common.

Magnificent specimens of alum, of sulphate of iron, and prussiate of potash, both yellow and red, are especially numerous; and the natural beauty of their fine crystals has been turned to account in the arrangement of several collections, but with this we are not disposed to find fault. The collection exhibited by M. Schattenmann, director of the mines of Bouxwiller, includes fine samples of the above-named salts, besides specimens of phosphorus, sal-ammoniac, bone black and glue, from bones. The sulphate of iron is not equal to some exhibited in other collections. The sample of this salt exhibited by Forgeais-Duhamel, Paris (No. 2360), is magnificent; we noticed none finer.

Crystallized sulphate of copper is exhibited in several collections. The specimen in case No. 1461, Camus et Cie., is very fine, as are also those of acetate of copper and acetate of lead, which accompany it. Acetic acid and methyline (*pyroxilic spirit?*) are included in the same exhibition.

A favourite show article among the French exhibitors is crystallized bismuth, of which large and beautiful specimens abound; in some of the cases it is heaped up almost like rockwork, and its silvery lustre and brilliant irridescence arrest the attention of not a few to whom the choice specimens ranged about it present no attractions.

No. 2325.—Bourguignon, à Paris. A very interesting collection of the products manufactured from the native nitrate of soda of Chili, including specimens of the crude salt, of the same refined in splendid crystals, nitrate of potash, labelled, "by double decomposition," nitric acid, and lastly, a considerable specimen of iodine obtained from the same source.

No. 2341.—Cournerie et Cie., à Cherbourg. Products obtained from crude soda from seaweed; of these the iodine, iodides, and bromides are very fine. The iodine is in extraordinarily large and brilliant plates, the iodide of potassium is in enormous crystals. There are also fine specimens of iodide of lead, mercury, &c., bromine, bromate of potash, bromide of potassium, &c. The samples are ample.

No. 2345.—De la Cretaz fils et gendre, au Havre. An interesting collection of native chromates of iron, including specimens from India, California, and

other parts of America, Norway, Sweden, Russia, Turkey, France (Dep. of Var), with samples of chromates of lead, potash, and zinc, bichromate of potash, and the green sesquioxide of chrominm.

No. 2353.—Dubosc, à Paris. Fine specimens of quinine, &c.

No. 2371.—De l'Isle de Sales et Cie., à Cordesse. Products obtained from bituminous schist. A very instructive collection, including bitumen, several samples of grease for carriage wheels, mineral black, tar, sal ammoniac, several specimens of parafine in different conditions, (some of them beautiful), benzine, manure, &c.

No. 2411.—Robiquet, à Paris. A beautiful collection of chemicals, among which are several organic products, magnificent specimen of alizarine, fine samples of mannite, amygdaline, asparagine, &c., citrate of magnesia, soluble variety (see *Pharmaceutical Journal*, vol. xv., p. 184) nitrate of uranium, crystallized bismuth, &c.

No. 2413.—De Sussex et Cie., à Paris. A showy exhibition, but containing some beautiful specimens, among which may be mentioned crystals of the chlorides of manganese and barium, nitrates of strontia and baryta, chlorate of potash, phosphate of soda, and very fine crystals of carbonate and bicarbonate of soda, also copious specimens of uric acid, alloxan, murexide, &c. Several samples of gelatine and soap.

No. 2420.—Véron et Fontaine, à Paris. Several preparations of cobalt, &c. Fine specimens of valerianate of quinine, atropine, codeine, meconine, cubebine, mannite, &c.

No. 2423.—Wittmann et Poulenc jeune, à Paris. An excellent exhibition. Fine specimens of gallic acid, benzoic acid sublimed in delicate acicular crystals (as in other French samples), boracic acid, the same fused, hyposulphite of soda, bromide of cadmium, chlorate of baryta, iron reduced by hydrogen, napthaline, and many others in considerable specimens. The bottom of the case almost too brilliant with bismuth.

No. ——.—Menier et Cie. à Paris. A fine collection of chemical and pharmaceutical preparations; the specimens are large and beautiful. Among organic products are fine samples of hydrochlorate, acetate and phosphate of quinine, hydriodate of morphia, double iodide of zinc and strychnine, terchloride of carbon, pure urea, mannite, &c. There are also numerous samples of powdered drugs and extracts. The powders have a high, and we believe, well-deserved, reputation. Many of the extracts are completely dried (as in other French exhibitions), and are prepared *in vacuo*.

(*To be continued.*)

NOTE ON CANADIAN ISINGLASS.

BY PROFESSOR OWEN, F.R.S.

In the department of Canada [Paris Exhibition, 1855], admirable for its arrangement, and for the illustrative selection and excellent quality of the products of that important Colony, an article of commerce, new in the sense of its being unknown to the Canadians as a native production in 1851, is exhibited, of excellent quality, and of annually increasing abundance. I allude to the Isinglass obtained from the sturgeons (*Acipenser* [*Huso?*]) which abound in the great rivers and lakes of North America. Noticing the absence of this article in the Canadian department of the London Exhibition of 1851, I at that time called the attention of the Colonial Commissioner to the fact of the existence in Canada of the fishes which yield the most valuable kind of isinglass, and I introduced to the Commissioner the chief London importer and preparer of isinglass, from whom he received the requisite details as to the best mode of obtaining and preparing isinglass, and as to its commercial value.

My attention was called by the same Commissioner, on my first visit to the Canadian department in the "Exposition Universelle," to the specimens there exhibited, and he gratefully recounted the success that had attended the efforts to establish a commerce for this new and valuable product, which, previous to 1851, had been rejected amongst the useless entrails of the sturgeons.

The value of the isinglass from this fish is chiefly due to its peculiar organic texture, on which its property of clarifying wines and beer depends; no artificial isinglass, however pure the gelatine, or identical as to chemical composition, with the air-bladder of the sturgeon, answers the purpose of the preparer of fermented liquors.

Hitherto Russia has been the chief source of the supply of isinglass. Our present relations with that country add to the value of the development of the same product in one of our own colonies ; and it might be recommended to the Colonial Authorities to afford every due encouragement, aid, and instruction, to the Canadians dwelling in the vicinity of the rivers and lakes, in the capture of the sturgeons, and the preparation of the air-bladder, and the outer tunic of the alimentary canal, after the modes of obtaining the best Russian isinglass.*

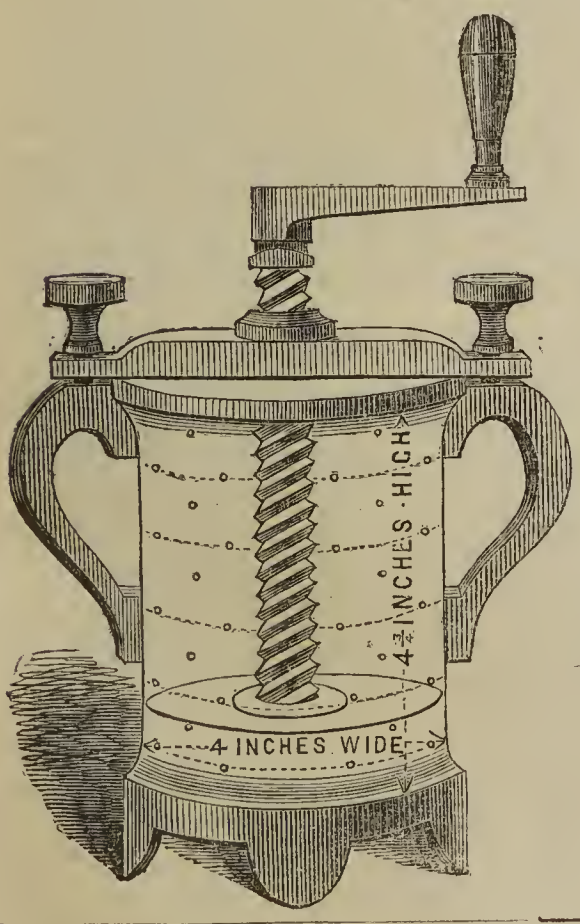
NOTE ON THE NATURAL MINERAL WATERS OF ALGERIA.

BY SIR JOSEPH F. OLIFFE.

Amongst the valuable products of Algeria exhibited in the Palais d'Industrie, not the least worthy of study and attention is the collection of natural mineral waters of that country. No less than forty-eight specimens of chalybeate, acidulous, saline, and sulphurous waters are exhibited, derived from various springs in Algeria. Many of these spas were well known to, and frequented by the Romans, as the remains of magnificent thermæ, piscinæ, &c., still attest. At the present day most of them enjoy reputation amongst the Arabs, and the French Government have granted considerable sums towards the restoration of some. The sulphuro-saline springs of *Hamma Mescoutin*, in the province of Constantine, deserve special notice, not only from their efficacy, but from the fact that in these *arsenic* was first discovered; the consequence was, that the researches of Chemists were directed in analyzing mineral waters, to the presence of arsenic as a constituent, and that this mineral has been lately ascertained to exist in several of our European springs, such as Montdore and many others.*

TINCTURE PRESS.

BY M. G. WEBER, PHARMACIEN, PARIS.



Exhibited at the Palais d'Industrie.

The cut is sufficiently intelligible without further description.

* *Notes of some Remarkable Objects in the Paris Universal Exhibition, furnished to the Board of Trade.* London, 1855. Part 1.

PRACTICAL RULES AND RECIPES IN ELECTRO-DEPOSITION.

BY GEORGE GORE, ESQ.

249. The following list includes nearly all the patents which have been taken out in connexion with the subject of electro-deposition :—Gilding copper, brass, and other metals, G. R. Elkington, June 24, 1836.—Gilding metals and coating with platinum (apparatus described), H. Elkington, Feb. 17, 1837.—Gilding and silvering certain metals (apparatus described), H. Elkington, December 4, 1837.—Coating and colouring certain metals, G. R. Elkington and O. W. Barratt, July 24, 1838.—Coating or plating certain metals, G. R. Elkington and H. Elkington, March 25, 1840.—Production of works of art by electro-deposition, Alexander Parkes, March 29, 1841.—Deposition of metals, O. W. Barratt, September 8, 1841.—Coating and colouring metals with other metals, H. H. Fox Talbot, December 9, 1841.—Electro-deposition, with apparatus, H. B. Leeson, June 1, 1842.—Coating metals with silver by electro-deposition, E. Tuck, June 4, 1842.—Coating metals and alloys with metal, J. S. Woolrich, August 1, 1842.—Making plated articles, R. F. Sturges, August 10, 1842.—Coating metals with other metals, H. H. Fox Talbot, November 25, 1842.—Deposition of metals, with apparatus, Moses Poole, May 25, 1843.—Gilding and plating metals, O. W. Barratt, June 15, 1843.—Deposition of metal upon felted fabrics, J. Schottlaender, December 8, 1843.—Deposition of metals and alloys, A. Parkes, February 21, 1844.—Depositing metals and their alloys, A. Parkes, October 24, 1844.—Coating metals and alloys, A. Parkes, October 9, 1845.—Deposition of metals, Lyons and Milward, March 23, 1847.—Brassing and bronzing steel, iron, zinc, lead, and tin, Charles De la Salzede, September 30, 1847.—Coating metals and non-metallic substances, Fontainemoreau, March 14, 1849.—Coating iron and other metals with metals and alloys, Russell and Woolrich, March 19, 1849.—Deposition of certain metals and alloys, A. Parkes, March 26, 1849.—Depositing metals, S. B. Smith, June 7, 1849.—Tinning metals, A. G. Roseleur, March 23, 1850.—Coating metals, Joseph Steele, August 9, 1850.—Coating glass with metal by battery process, J. Ridgway, April 20, 1852.—Coating surfaces of iron, M. Lyons, October 7, 1852.—Deposition of brass and german silver, Morris and Johnson, December 11, 1852.—Reducing metals by electricity and plating, C. J. E. Junot, December 28, 1852.—Silvering metals and glass, J. Power, December 29, 1852.—Improvements in depositing metals and alloys of metals, W. E. Newton, July 29, 1853.—Coating cast iron with metals and alloys, W. Newton, August 5, 1853.—Electro-coating with zinc, C. C. Person, April 27, 1854.

250. The following errors have occurred in the foregoing series of articles upon electro-deposition :—Paragraph 4 should have been divided into two paragraphs, at the words "In every case." The same with paragraph 12, at the words "We have seen;" and with paragraph 20, at the words "In coating articles by the single cell process." Paragraph 25, experiment 5, for "ernitrate," read *ternitrate*. Paragraph 31, line 1, for "making up," read *making*. Paragraph 36, for "Morselman," read *Mosselman*. Paragraph 41, for "zinc lates," read *zinc plates*. Paragraph 58, for "wired before," read *wired after*. Paragraph 59, line 5, after the words "oil of vitriol," insert *or weaker*. Paragraph 65, last line, for "rubbing them with," read *dipping them into*. Paragraph 80, after the words "960 grains of bisulphide of carbon," insert *and* 80 *grains of spirits of turpentine and* 64 *grains of asphalte in the state of fine powder*. Paragraph 197, line 6, for "then," read *than*. Paragraph 206, line 10, insert a comma after the word "gold," and expunge it from after the word "evaporated." Paragraph 215, line 8, for "perchloride," read *terchloride*. Paragraph 232, line 11, for "chloride," read *bichloride;* and paragraph 233, last line, for "an uncommon energy," read *uncommon energy*.

TRIBASIC PHOSPHATE OF SODA.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—A recent publication of Dr. Spurgin's, entitled *The Physician for All*, was lately put into my hands for perusal, accompanied by the request that I would prepare a small quantity of the "Liquid Condiment," recommended by the author. In an attempt to perform the latter, I met with an unexpected result, an account of which, although it involves no startling or original facts, may perhaps not prove uninteresting.

The preparation is directed by Dr. S. to contain common salt, phosphate of soda, and liquor potassæ, to be filtered through a stratum of calcined magnesia, and then used with all food taken.

To effect this, I dissolved about three drachms of salt, and the same quantity of phosphate of soda in an ounce of liquor potassæ, diluted with an equal quantity of water. When nearly dissolved, a small quantity of calcined magnesia was added, and almost immediately after, the whole solidified into a crystalline mass, that had not the least fluidity. This, following as it did the addition of magnesia, I attributed to a chemical reaction in which the magnesia played an important part, overlooking at the time the well-known fact that the presence of a nucleus always hastens crystallization, and not unfrequently causes it to occur immediately. I considered it probable that a compound 2 Na O, Mg O, PO_5 + Aq had been formed, magnesia having replaced the basic water of the diphosphate. A few trials, however, exploded the idea. I was not successful at first in reproducing the crystallization, but I eventually found that it may be certainly done by proceeding thus:—Dissolve one drachm of common salt in a sufficiency of liquor potassæ, and to two drachms of finely powdered phosphate of soda in a separate vessel add enough liquor potassæ to give it mobility (to favour rapidity of mixture). Throw the solution of salt into the last mixture, and agitate them for a few seconds with a rod; they will then almost immediately yield such a mass of crystals as to become completely solid, so that the vessel may be inverted without spilling any. The crystals are needle-shaped, and exceedingly small.

I then thought the crystals might be a triphosphate of soda and potass; if so, the chloride of sodium was unnecessary, but attempts to succeed without it, failed. I still thought it probable that it acted only by lessening the solvent power of the liquid, and thus indirectly promoting the crystallization, but on increasing the proportion of phosphate, and again on substituting nitrate of potass for salt, the result was not satisfactory; there appeared to be no tendency to crystallize, but on adding salt to either of these mixtures, already superabounding as they were in saline matter, it commenced directly. Sulphate of soda had the same effect, but in a less degree. It was clear then that a soda compound was necessary, and that the crystals were probably triphosphate of soda 3 Na O, PO_5 + Aq. To ascertain this, they were purified by repeated crystallization, and were then found to have an alkaline reaction with litmus paper, to give a yellow precipitate with nitrate of silver, and the same after being ignited. To ascertain the proportion of water of crystallization, 3.4 grains were ignited, and were found to have lost 1.9 grains; this, calculated on the assumption that the salt was the triphosphate of soda, gives twenty-four equivalents, forming the compound 3 NaO, PO_5, + 24 HO, the salt described in chemical works.

To conclude, it appears that on dissolving the chloride of sodium in caustic potass, the negative element is divided between the two metals, and the solution contains the oxides and chlorides of potassium and sodium, and that it is to the oxide of the latter metal the formation of the new salt is due. The fact that it may be thus made appears to be of no importance, yet being thoroughly convinced of the error of the *cui bono* argument, I have ventured to make the fact known to our Society, through the columns of its valuable Journal.

Weymouth, Oct. 30, 1855. Thomas B. Groves, M.P.S.

SCALE OF MEDICINES AND MEDICAL STORES

Suitable to Accidents and Diseases arising on Sea Voyages, to be kept on board British Merchant Ships navigating between the United Kingdom and any place out of the same, on and after the 1st day of January, 1856.

Issued by the Board of Trade, in pursuance of 17 *and* 18 *Vict., chap.* 104, *section* 224.

Names of Medicines, Medicaments, &c.	Proportions for Ships carrying the undermentioned number of Men and Boys.		
	Column 1. 10 and under.	*Column* 2. From 11 to 20, inclusive.	*Column* 3. 21 and upwards.
Castor oil	1 lb.	2 lb.	3 lb.
Epsom salts	3 lb.	6 lb.	12 lb.
Calomel	...	1 ounce	2 ounces
Powder of jalap	...	1 "	2 "
Ditto rhubarb	1 ounce	2 "	3 "
Cream of tartar	2 "	4 "	8 "
Sulphur (sublimed)	4 "	6 "	8 "
Alum	1 "	2 "	3 "
Powdered ginger	1 "	2 "	3 "
Sulphate of quinine	½ "	1 "	2 "
Ditto ditto, in vessels trading to the East or West Coast of Africa, to the Coasts of China and Borneo	1 "	2 "	4 "
Balsam of copaiba	4 "	8 "	12 "
Carbonate of magnesia	2 "	3 "	4 "
Olive oil	...	8 "	12 "
Spirit of turpentine	2 "	4 "	6 "
Laudanum	2 "	4 "	8 "
Bicarbonate of soda	...	12 "	16 "
Tartaric acid (powdered)	...	8 "	12 "
Goulard's extract	1 "	2 "	4 "
Compound chalk powder (in a stoppered bottle)	1 "	2 "	3 "
Dover's powder	1 "	2 "	3 "
Essence of peppermint, each ounce to contain one drachm of the oil	1 "	2 "	3 "
Purging pills, each to contain of the compound extract of colocynth 4 grains, and calomel 1 grain	3 dozen	6 dozen	8 dozen
Ditto powders, each to contain of calomel 2 grains, and compound powder of jalap 1 drachm	1 "	2 "	3 "
Opium pills, each to contain of opium 1 grain, and Castile soap 4 grains	1 "	2 "	3 "
Emetic powders, each to contain ipecacuanha 1 scruple, and emetic tartar 2 grains	1 "	2 "	3 "
Blue pills, 5 grains each	2 "	3 "	4 "
Powders, sudorific, 10 grains of nitre, 10 grains of cream of tartar, and 5 grains of Dover's powder	1 "	2 "	3 "
Simple ointment	6 ounces	12 ounces	16 ounces
Mercurial ditto	2 "	4 "	8 "
Basilicon ditto	3 "	6 "	10 "
Blistering plaister	2 "	4 "	8 "
Adhesive plaister (in tin case)	1 yard	2 yards	3 yards
Disinfecting fluid (Burnett's solution)	14 pints	28 pints	56 pints
Tincture of rhubarb	4 ounces	10 ounces	12 ounces
Opodeldoc	3 "	6 "	10 "
Paregoric	4 "	6 "	8 "

Names of Medicines, Medicaments, &c.	Proportions for Ships carrying the under-mentioned number of Men and Boys.		
	Column 1. 10 and under.	*Column* 2. 11 to 20, inclusive.	*Column* 3. 21 and upwards.
The following in addition in all Vessels carrying a Surgeon, with 50 *or more persons on board:—*			
Nitric ether	...	...	2 ounces
Acetate of lead	...	...	2 "
Croton oil	...	...	2 drachms
Camphor	...	...	1 ounce
Tartar emetic	...	...	½ "
Hydriodate of potass (iodide of potassium)	...	...	2 ounces
Ergot of rye	...	...	2 "
Tincture of digitalis	...	...	2 "
Powder of ipecacuanha	...	...	1 "
Sulphate of zinc	...	...	1 "
Lunar caustic	...	...	1 "
Muriate of morphia	..	...	1 drachm
Watery extract of aloes	...	...	1 ounce
Blue pill	...	...	1 "
Aromatic confection in powder	...	...	2 ounces
Prepared chalk	...	...	½lb.
Scale of Medical Stores and Necessaries.			
Arrowroot	1lb.	2lb.	4lb.
Pearl barley	2 "	4 "	8 "
Rice	4 "	8 "	12 "
Lint	¼ "	½ "	¾ "
Sponges	1 ounce	1½ ounce	2 ounces
Scales and weights	1 set	1 set	1 set
Graduated drop measure	...	1 No.	1 No.
Scissors	...	1 pair	1 pair
Syringes	2 No.	2 No.	2 No.
Lancets	2 "	2 "	2 "
Bandages of different sizes	...	6 "	6 "
Calico	3 yards	4 yards	6 yards
Flannel	2 "	3 "	6 "
Needles, pins, and thread	...	1 paper	1 paper
Splints, common	1 set	1 set	1 set
Trusses, single, 36 inches in girth	1 No.	1 No.	1 No.
Pestle and mortar	1 "	1 "	1 "
Enema syringe, with printed directions for use	1 "	1 "	1 "
Tile	...	1 "	1 "
Funnel	...	1 "	1 "
Pewter cup, small	...	1 "	1 "
Teaspoons, pewter	...	1 "	1 "
Spatula	...	1 "	1 "
Bougies	1 set	1 set	1 set
Tape	1 piece	1 piece	1 piece
Catheter	1 No.	1 No.	1 No.

NOTE 1.—Section 224 of the "Merchant Shipping Act, 1854," contains the following provisions, viz.:—"The following rules shall be observed with respect to medicines, medical stores, and antiscorbutics; that is to say: (1.) The Board of Trade shall from time to time issue and cause to be published a scale of medicines and medical stores suitable to accidents and diseases arising on sea voyages. (2.) The owner of every ship navigating between the United Kingdom and any place out

of the same, shall provide, and cause to be constantly kept on board such ship, a supply of such medicines and medical stores in accordance with the said scale; and if, in any such ship as aforesaid, such medicines, medical stores, lime or lemon juice, or other articles, sugar and vinegar, as are hereinbefore required, are not provided and kept on board as hereinbefore required, the master or owner shall incur a penalty not exceeding twenty pounds; and if the master of any such ship as aforesaid neglects to serve out the lime or lemon juice, or other articles, sugar or vinegar, in the case and manner hereinbefore directed, he shall for each such offence incur a penalty not exceeding five pounds; and if any master is convicted in either of the last-mentioned penalties, and it appears that the offence is owing to the act or default of the owner, such master may recover the amount of such penalty, and the costs incurred by him, from the owner.

Note 2.—In ships employed trading solely between places in Europe, or between places on the shores of the North Atlantic or Mediterranean, and in ships employed in the Greenland or Baffin's Bay trade, or in any of the northern fisheries, the proportion of the various articles above mentioned need not exceed the proportions mentioned in the second of the above columns, notwithstanding that the number of men and boys may exceed twenty.

Note 3.—Passenger ships which are certified under the 44th section of the "Passengers' Act, 1855," to be duly supplied with medicines, need not be also provided with medicines or other articles according to the above scale.

MANUFACTURE OF YELLOW PRUSSIATE OF POTASH, RED PRUSSIATE OF POTASH, PRUSSIAN BLUE, CYANIDE OF POTASSIUM, &c.

(*Continued from page* 226.)

Under one of his patents, Mr. Laming makes use of charcoal or other form of carbon in powder, mixed with one of the alkalies, or its carbonate or other salt, capable under the circumstances, of surrendering its metallic base to cyanogen. This mixture is constantly maintained in a fused state, so as to be fluid, or at least in a pasty condition, which is highly favourable for converting the metallic base of the alkali or its salt into a cyanide, and which takes place rapidly under such circumstances, when a current of ammonia gas is introduced into the fused mixture. The metallic base of potash or soda, or of their compounds respectively, as the case may be, is liberated by the agency of the heated carbon, assisted by the affinity of the metallic base, from the cyanogen, which is at the same time formed by the combination of heated carbon with the nitrogen of the ammonia; cyanide of the metallic base is thus produced, and this product is constantly augmented in quantity (the current of ammonia being continued) until each part of the alkali or other compound of its base has become converted into cyanide. When an alkaline carbonate is used, powdered charcoal to the amount of more than thirty per cent. of its weight may be added without destroying the fluidity of the mixture if the temperature is raised to a full red. When the potash or soda is in a caustic state a larger proportion of charcoal may be added, or what is more advantageous, the mixture will remain fluid, although the heat be not raised so high. Whether the ammonia gas is passed through the mixture of carbon and fused alkali or other compound of its metallic base (which is preferred) or over its surface, it is better to have more than one vessel charged with the heated materials, and so connected together by pipes that the nitrogen of the ammonia, which escapes the chemical reaction in the first vessel, shall not pass through the whole series without combining. The apparatus thus acts on the principle of a series of Woulfe's bottles, and according to this invention all the vessels are made red hot, except the last, into which water, or some liquid convenient for arresting the vapours of the alkaline metal, is put, or otherwise the vapours might be lost. The first product, as in the common process for making prussiate, is a cyanide of the alkaline metal present, which may be dissolved from out the mass, technically called "metal," by boiling the latter in alcohol of about 0.896 sp. gr., from which filtered hot, it spontaneously separates, in great part, on cooling. To obtain the ferrocyanide, the metal is to be treated in the usual way, namely, its soluble parts dissolved in water, then treated with iron, the solution evaporated, and when sufficiently concentrated and clear, set aside to crystallize, and the rough product afterwards purified by re-crystallization.

With a view of manufacturing prussiate of potash in a more economic manner than heretofore, Mr. Spence has recently patented the use of sulphate of potash in place of the carbonate, obtaining the cyanogen from refuse leather. He uses the same sort of pots or calcining vessels as are now in ordinary use, observing the same rules as to heat, &c. The sulphate of potash employed is of considerable purity, as free as possible from other salts, and the pots are charged with as large a quantity as they will conveniently work, allowing room for the expansion or swelling that takes place when the old leather is introduced. When the sulphate of potash is brought to a full red heat it is fluxed, or becomes pasty or semifluid. He then takes old leather, such as old shoes or other refuse leather, and adds it gradually and in a dry state to the fused sulphate of potash in the pots, diligently stirring after each addition of the old leather, and adding further quantities as soon as that put in has become charred and mixed with the sulphate of potash. When as much leather has been added as is equal to double the weight of sulphate of potash used and the mixture grows thick, no more leather is added. The heat is now kept up for three or four hours, the pots during that time being kept completely closed, except only a small vent to allow the gases to escape, but not to allow air to enter. The pots are opened and the mixture stirred once every hour. As soon as the calcination is considered as completed, the pots are opened and the calcined material ladled out, when a new charge is introduced. The calcined material or "metal" is put into a vessel with water, and heat applied to dissolve out all the soluble matter it contains, when the sediment is allowed to subside and the clear liquor run off, evaporated, and crystallized. A crop of impure prussiate of potash crystals are thus obtained, which are afterwards purified by re-crystallization; the mother-liquor, however, still contains a large quantity of prussiate of potash in solution, which cannot be crystallized out of it, and it also contains carbonate of potash and sulphuret of potassium. In the ordinary mode of manufacturing prussiate of potash, the crude mother-liquors are boiled down to dryness, and the salt thus obtained is returned to the calcining pots along with a new quantity of pearlash or potash. Instead of so boiling down, Mr. Spence adds to the crude mother-liquors sufficient sulphuric acid to convert all the before-named compounds of potash into sulphate of potash, and then adds to it a solution of sulphate of iron as long as any precipitate is thrown down. This precipitate, which is Prussian blue, is allowed to fall to the bottom, and the clear solution of sulphate of potash is now run off from it; water is then added to wash the Prussian blue, and after stirring and again settling the clear liquor is run off a second time and added to the liquor which was previously run off from the Prussian blue. These liquors are now boiled down to dryness, and the sulphate of potash thus obtained is returned to the calcining pots, along with new quantities of sulphate of potash for again charging the said calcining pots. The Prussian blue being now in the state of a very liquid pulp, is added to the next charge of metal from the pots, and put both together into the vessel in which the prussiate is dissolved out. and after the addition of a sufficient quantity of water, the whole is boiled together by steam heat for at least an hour; the soluble matter is thus dissolved out and the carbonate of potash and sulphuret of potassium are enabled to re-act upon the Prussian blue and to take from it all or nearly all the prussic acid which it contained. The liquor being now allowed to settle and evaporated to the required density, will yield a much larger crop of impure prussiate of potash crystals than it would without the use of the Prussian blue as above described.

Manufacture of Prussiate of Potash from the Products obtained in the Distillation of Coal.—Large quantities of cyanogen are given off during the decomposition of coal in the ordinary process of gas making, and prussiate of potash and Prussian blue manufactured therefrom.

To make prussiate of potash from the pulpy coarse blue, obtained by treating the *weaker* ammoniacal liquors of gas works (as described under Prussian blue), Mr. Spence proceeds as follows :—To every 100lbs. of pulpy coarse blue, 9lbs. of ordinary potash dissolved in two gallons of water are added, and the mixture heated to 150° Fahr., at which temperature it is kept for three hours, with frequent stirring : the whole is then allowed to settle, the clear liquor drawn off, and the sediment thrown on a filter and washed. The clear solution is then evaporated and crystallized.

To make prussiate of potash from the coarse powder obtained by treating the *stronger* ammoniacal liquors, Mr. Spence employs the following operations :—To every 100lbs. of the coarse powder, 8lbs. of potash or 9½lbs, of pearlash, dissolved in

two gallons of water and heated to 200° Fahr., are added ; the mixture is stirred frequently during two hours, when eight gallons of water at 212° are added, the whole stirred and allowed to settle. The clear liquor is now drawn off, and the sediment thrown on a filter to drain and be washed with six gallons of water at 200° : the filtered liquor is added to that drawn off and brought to a boil, when 8lbs. of oxide of iron are added, and the whole boiled for ten minutes. The clear liquor is then drawn off from the sediment, evaporated, and crystallized.

To make prussiate of potash from the hydrocyanate of lime obtained from the refuse of the lime purifiers, Mr. Spence adds a concentrated solution of potash to the liquor as long as a white precipitate is thrown down ; this precipitate is allowed to settle, and the clear liquor drawn off ; this is heated to 212°, and 1lb. of red oxide of iron added for each pound of potash employed ; the whole is boiled together for ten minutes and allowed to settle : the clear liquor is then drawn off, evaporated, and crystallized.

Mr. Laming has patented a mode of manufacturing the prussiates of potash, soda, and ammonia from prussiate of lime obtained in the purification of coal gas. In the manufacture of prussiate of potash, equivalent quantities of prussiate of lime and of either sulphate or carbonate of potash, previously dissolved in water, are mixed together, and after the sulphate or carbonate of lime has precipitated, the supernatant solution of prussiate of potash is drawn off, filtered, evaporated, and crystallized. The same process is applicable to the manufacture of the prussiates of soda and ammonia—substituting the salts of soda and ammonia for those of potash.

Commercial ferrocyanide of potassium is often contaminated with carbonate and sulphate of potash. It may be purified by dissolving it in the smallest possible quantity of hot water, leaving the sulphate of potash with part of the ferrocyanide of potassium to crystallize by cooling ; decanting the mother-liquor and mixing it with alcohol ; washing the precipitated ferrocyanide of potassium with alcohol, and crystallizing it once more from water.

Red Prussiate of Potash.—Ferricyanide of Potassium.—To prepare this salt chlorine gas, freed from hydrochloric acid by washing with water, is passed with constant agitation through a cold aqueous solution of ferrocyanide of potassium, till a sample taken out of the liquid (the yellow colour of which becomes continually deeper) on being added to the solution of a persalt of iron perfectly free from protosalt of iron, no longer throws down Prussian blue, but forms a clear brown mixture. The liquid is then evaporated over a water-bath till crystals begin to form. The crystals increase in quantity as the water-bath cools, and may be purified by repeated crystallization. If the chlorine acts unequally on the different parts of the liquid, or in excess, further decomposition takes place, resulting in the formation of chloride of cyanogen, and a dark red liquid is produced, which, on evaporation, deposits Prussian green, whereby the purification of the salt is rendered much more difficult. Hence it is necessary to stir the liquid constantly, and test it frequently with a persalt of iron. The crystals obtained by the first evaporation are often mere needles, but in separating them from the mother-liquor, washing them with cold water, dissolving them in hot water, again evaporating, and repeating this process several times, the liquid ultimately purified by filtration yields thick crystals an inch in length. The mother-liquor is mixed with the washings, and again evaporated as long as red crystals continue to form. The mother-liquor, after this treatment, contains scarcely anything but chloride of potassium, and sometimes a small quantity of reproduced ferrocyanide ; hence the crystals last separated from the mother-liquor must be tested with a persalt of iron, to see whether they contain ferrocyanide of potassium, and in that case they must be again treated with chlorine. The chloride of potassium contained in the unpurified solution appears to be the cause of its effloresceing so rapidly during evaporation and cooling, for this reason it is advisable to use vessels with deep sides. Larger crystals are produced by hot evaporation, than by cooling in rapidly boiled solutions.

The above-described method of manufacturing red prussiate of potash was for some time the one generally employed, and as the practical working of the process implied some chemical skill on the part of the operator, the process came to be regarded as both difficult and secret ; for an excess of chlorine not only constituted a waste, but moreover actually destroyed the red prussiate when formed, and thus led to a total failure.

Red prussiate of potash is now manufactured in the dry way, and the ill effects of

chlorine are easily obviated. To prepare it, a quantity of the ordinary yellow prussiate of potash is reduced to a very fine powder and subjected to the action of chlorine gas, with repeated agitation—such as, for example, that which can be produced in a churn. In this way the chlorine is rapidly absorbed, and chloride of potassium and red prussiate of potash formed. When it is found that the chlorine passes freely through the mixture, without being absorbed, the process is stopped, and the powder withdrawn. This powder, on being dissolved in the smallest possible quantity of water, heated to about 180° Fahr., will produce on cooling long needle-shaped crystals of red prussiate of potash, which may be rendered purer and larger by re-crystallization in the usual way; the chloride of potassium, meanwhile, remaining dissolved in the mother-liquor.

It is not improbable that this salt might be made by means of the permanganate of potash or chamelion mineral, as the manganesic acid parts with its oxygen with extreme facility when in solution—in this case a saving would occur in the process even independently of the cost of chlorine—for no chloride of potassium would be formed from the potash of the yellow prussiate.

Mode of estimating the Value of Red Prussiate of Potash.—For the estimation of red prussiate of potash M. Liesliing recommends the employment of sulpharseniate of sodium. For every 100 grains of pure red prussiate twenty grains of sulpharseniate of sodium are required. In conducting the process 100 grains of red prussiate are dissolved in two ounces of water, and a separate solution of twenty grains of sulpharseniate, together with forty or sixty grains of pure carbonate of soda or potash in 400 measures of water is made, and introduced into an alkalimeter tube. Each measure will thus contain one-twentieth of a grain of the sulpharseniate, and will indicate one-fourth per cent. of pure red prussiate. The mixture, as the decomposition takes place, acquires a pure white colour; and when this has been attained the liquor is tested with a decoction of cochineal, which, on being added, is decolorized if the transformation of the ferricyanide into ferrocyanide has not been completed; but when the transformation is complete the cochineal colour is imparted to the solution.

Cyanide of Potassium.—Distil two parts of ferrocyanide of potassium with one and a half part of sulphuric acid and four parts of water till the mass begins to jump, and pass the vapour (hydrocyanic acid) into a cooled receiver containing the filtered solution of one part of hydrate of potash (not fused but evaporated till it solidifies on cooling) in three or four parts of alcohol of ninety per cent. or stronger. The cyanide of potassium, as it forms, falls to the bottom from the beginning of the action, and the contents of the receiver ultimately form a solid magma. The solid product is drained as completely as possible on a filter, the crystals washed several times with strong alcohol, then well pressed between bibulous paper, and dried as quickly as possible; as, for instance, on a heated plate. In this manner eight parts of ferrocyanide of potassium yield three parts of cyanide in the form of a white crystalline powder. For the success of this process it is important that the hydrocyanic acid be as strong as possible, so that a weak acid must first be dehydrated by chloride of calcium; that the strength of the alcohol be at least ninety-two per cent.; and that the solution of potash in that liquid be fresh; inasmuch as it turns brown after a-while. When the hydrocyanic acid is in excess, the cyanide of potassium appears to remain dissolved in the liquid for a longer time, hence the potash solution must be in slight excess.

Liebig's Dry Process.—Mix intimately eight parts of ferrocyanide of potassium, perfectly dehydrated by calcination, and three parts of perfectly dry carbonate of potash, and heat the mixture in a covered crucible, or what is better, an iron pot, until the fused mass attains a red heat, when it will become limpid, and a sample taken out with the rod and cooled will appear perfectly white. In this state all the ferrocyanide is reduced. If the crucible be now taken out of the fire, the disengagement of gas ceases when the mass has become a little cool, and the iron which has been separated in the operation so disposes itself, that with a little address and slight tapping of the crucible, the principal part of the cyanide of potassium may be poured off from the iron which remains in the crucible.

To obtain the cyanide perfectly free from iron, place it across an iron ladle pierced with fine holes, and strongly heated beforehand, in a vessel also heated, of greater height than width, either of silver, iron, or porcelain, or even fire-ware, but with

smooth sides, and let it gradually cool. In this state the ferruginous portion may be extracted by means of a sharp instrument, from that which is free from iron. The purity of the cyanide of potassium entirely depends on the purity of the materials employed; the presence of sulphur in the carbonate of potash should therefore be avoided; the ferrocyanide of potassium of commerce almost invariably contains sulphate of potash, the presence of which is objectionable. The use of purified tartar might perhaps be advantageously substituted for that of carbonate of potash. Should any sulphur be present, the cyanide of potassium would be contaminated by sulphuret of potassium, from which considerable inconvenience would arise in the employment of the cyanide in chemical analysis, and in its application to the preparation of gold, silver, and copper solutions employed in the electro-plating processes.

When the mixture is melted, as before mentioned, there is at first formed only cyanide of potassium and carbonate of the protoxide of iron; but this last quickly changes, at the temperature to which it is exposed, into carbonic acid, carbonic oxide, and sesquioxide of iron; and this last, when the cyanide of potassium is melted, becomes converted into metallic iron. It is only by a long sustained heat that the carbonate of protoxide of iron is decomposed, so that long after the decomposition of the ferrocyanide of potassium and the formation of cyanide of potassium has taken place, there is still a disengagement of gas; consequently, the proportion of cyanide of potassium, which is simultaneously formed, should entirely depend on the duration of the fusion.

The iron which remains after a prolonged fusion of the cyanide of potassium, out of contact of air, being washed with hot water, disengages, when an acid is poured on it, not only hydrogen, but always a little carbonic acid gas.

If the directions given in many chemical works (wherein Liebig's process is incorrectly stated) be followed, and in which it is stated that the materials must be melted, so that the mass submitted to a bright red heat becomes tranquil, only a grey-coloured product will be the result.

If a closed iron vessel be employed, and the disengaged gases collected, it will be seen that in proportion as the temperature rises, the relative proportion between the carbonic acid and the carbonic oxide changes, the latter constantly increasing. It is evident that at a high temperature, one portion of the carbonic acid which passes through the cyanide of potassium, should be reduced into carbonic oxide; and this reduction, without doubt, extends even in part to the carbonic oxide itself; that is to say, that its carbon is separated, and that this renders the product of a grey colour. If we dissolve in cold water some cyanide of potassium, completely free from particles of iron, and which has thus become grey, and filter the solution, there remains on the filter a black substance, which, being dried, burns away completely on a slip of platinum, and in fact possesses all the qualities of charcoal. This carbon, in a state of extreme division, does not separate either by fusion or repose, from the cyanide of potassium, on account of its feeble specific gravity. If a little of this grey cyanide be added to each new melting, it may be purified from this carbon, and no injury done to the product of the new materials employed, as the iron, in separating, withdraws the finely divided carbon, and leaves the cyanide in a state of purity.

In the preparation of cyanide of potassium, a grey product is frequently obtained, if the mixture of ferrocyanide of potassium and carbonate of potash be exposed to a bright red heat, until the mass is in a state of quiet fusion. This may be avoided, according to Clemon, by removing the crucible from the fire as soon as the dull red-hot mass appears clear, and a sample taken out is perfectly white. The evolution of gas having ceased, the deposition of the iron may be accelerated by gentle percussion, and the cyanide of potassium passed through a finely perforated hot iron spoon, and collected in a tall, smooth-walled vessel of silver, iron, or porcelain, in which it is allowed to cool slowly. Grey cyanide of potassium may be added in new fusions, and treated by the above process, when it will become white.

Cyanate of Potash.—Fuse eight parts of ferrocyanide of potassium and three parts of carbonate of potash, and introduce gradually into the mixture, somewhat cooled after fusion, but still liquid, fifteen parts of minium, care being taken to avoid too considerable a rise of temperature. Place the crucible once more in the fire, well stir the mass, pour out and cool. If the salt is to be used for the preparation of urea,

the mass should be directly saturated with cold water and mixed with eight parts of sulphate of ammonia, which may be dissolved in the washings. Evaporate the mixture and treat in the usual way. If ferrocyanide of potassium should be present in the alcoholic solution, it may be separated by carefully adding sulphate of sesquioxide of iron, and pouring off the clear solution from the Prussian blue which forms: four parts of anhydrous ferrocyanide of potassium yield four to five of urea.

(*To be continued.*)

AN EXPERIMENTAL INQUIRY INTO THE NATURE OF THE METAMORPHOSIS OF SACCHARINE MATTER, AS A NORMAL PROCESS OF THE ANIMAL ECONOMY.

BY DR. PAVY.

The author begins by observing, that the saccharine matter met with in the animal economy is derived from two sources—from the vegetable kingdom, and from the liver of the animal itself; in each case being poured into the general circulation through the hepatic veins. The liver not only enjoys the power of forming sugar, but it likewise exerts (as shown by the experiments of Bernard) some modifying influence over that which is traversing its capillaries and which has been absorbed from the food, by which it is transformed from *vegetable* into *animal* sugar, and thus rendered more apt for serving in the processes of animal life.

The sugar poured into the general circulation through the hepatic veins is conveyed to the capillaries of the lungs, where it in great part disappears, but never entirely so, according to very numerous analyses which the author has made on this subject. If the blood be traced onwards from the arteries through the systemic capillaries into the veins, the small amount of sugar which impregnates arterial blood will be found to be still undergoing a process of destruction; and what appears exceedingly interesting, this process of destruction is not carried on with equal activity in the different parts of the system at large. In the capillaries of the chylo-poietic viscera, the destruction is so complete, that the blood in the portal vein may be entirely free from saccharine principle, when the blood returning from other parts, as that contained in the femoral or jugular veins, remains slightly impregnated. This curious fact has a bearing that will be presently adverted to, with reference to the views to be advanced concerning the nature of the metamorphosis of sugar in the animal economy.

The *principal* seat of destruction of saccharine matter in the animal system being located in the respiratory organs, seems at first sight to support the theory of Liebig—that sugar is one of those substances which undergoes a process of combustion, by its direct combination with oxygen and its resolution into water and carbonic acid. Some experiments on the temporary obstruction of the respiration, and the examination of arterial blood before and after the operation, led the author to call in question this view, as he observed that notwithstanding the supply of oxygen was cut off to such an extent as almost to occasion death, yet a considerable destruction of sugar took place in the lungs. This, coupled with the fact that a disappearance of sugar takes place in the systemic capillaries, and unequally so in different portions of them, induced him to push his investigations, and see if there might not be some other cause in operation in the living animal to effect the normal destruction of sugar, besides the direct chemical action of the oxygen absorbed in respiration. The results of these investigations, which were first directed towards the changes produced in blood normally containing sugar, injected through the capillaries of lungs removed from the animal, and artificially inflated with atmospheric air or oxygen gas, have induced the author to refer the metamorphosis of sugar in the animal economy, to a process which is perfectly consistent and analogous with the well-known chemical bearings of this substance apart from the animal system.

In experiments which the author has now several times repeated, he injected blood removed from the right side of the heart of an animal—and therefore normally containing sugar—through the capillaries of the artificially inflated lungs of another; and found that as long as the blood retains its fibrine, there is as much destruction of its sugar as would take place in the living animal; but that where the fibrine has been separated from the serum and corpuscles, the sugar ceases to be

influenced by the presence of oxygen, or ceases to disappear during this process of artificial respiration. It would hence appear, that something besides mere contact with oxygen is requisite for the destruction of sugar. But in other experiments, he has found that oxygen is nevertheless a necessary agent concerned in the process of transformation observed during the arterialization of the blood that has not undergone spontaneous coagulation. It would therefore seem, in fact, that oxygen acts secondarily on the sugar through the medium of the fibrinous constituent of the blood:—that it exerts some changes upon this azotized principle, which are capable of inducing the metamorphosis of sugar.

If we look to the ordinary chemical bearings of saccharine matter apart from the animal system, we find that an azotized substance undergoing the molecular changes of decomposition, placed in contact with sugar, readily excites a process of fermentation, and converts it by a mere alteration of the grouping of its elements into another substance, one atom of sugar (C_{12} H_{12} O_{12}) being resolved into two atoms of lactic acid (C_6 H_6 O_6). We also find that sugar is not susceptible of oxidation except under the influence of strong chemical reagents. Chemical analogy, therefore, would lead us to look upon the secondary action of oxygen as the more probable process of physiological destruction; especially when we take into consideration, that nowhere do we meet with such a constant series of molecular changes taking place as amongst the azotized constituents of a living animal. In the above-mentioned experiment of injecting fibrinated and defibrinated blood through an artificially inflated lung, when the blood is capable of undergoing the molecular changes of assimilation on contact with oxygen as in the living animal, the sugar in great part disappears, but so soon as the fibrine is separated by spontaneous coagulation, and the blood has thus lost its vital characteristics, oxygen is no longer capable of exerting any metamorphosing influence on its saccharine ingredients.

If the molecular changes occurring during the decomposition of an azotized substance be capable of converting sugar into lactic acid, why should not the molecular changes occurring during the building-up or elaboration of this same nitrogenized compound effect the same? Indeed, we have seen that the process of destruction is carried on to a certain extent in the systemic capillaries, and more especially in those of the chylo-poietic viscera, where the molecular changes of nutrition are also correspondingly carried on with greater activity than elsewhere. So that analogy and experiment would tend to show that the physiological destruction of sugar is owing to a process similar to fermentation induced by the molecular changes occurring in the nitrogenized constituents of the animal during life; and, in accordance with this, we find lactic acid present in the system, and largely separated from arterial blood by the muscular tissue, and the secerning follicles of the stomach.

As regards the lactic acid fermentation, it is well known that the presence of an alkali favours, whilst that of an acid retards the process. In two experiments on animals, the author injected carbonate of soda and phosphoric acid into the circulating current, and observed in the case of the latter that sugar immediately accumulated in the blood.

The preceding observations refer more especially to the changes that take place in the saccharine ingredient of the blood during life; and the author next proceeds to notice some interesting phenomena observable during the decomposition, and even the spontaneous coagulation of blood containing sugar.

If the blood of an animal normally impregnated with sugar be placed aside, and allowed to undergo spontaneous coagulation, on examining separately the serum and clot on the following day it will be found, that although the serum may be largely saturated with sugar, the clot is entirely, or almost entirely, destitute of it. Now, as the clot is moist and remains to a certain extent infiltrated with the serum from which it has partially separated, it would appear that even the molecular changes arising from the spontaneous coagulation of the blood are sufficient to effect the destruction of normal animal sugar; and this conclusion is strengthened by the fact, that in diabetic blood (the sugar of which, as would appear from other considerations also, is not so susceptible of metamorphosis as the healthy variety) the sugar does not disappear to a similar extent in the clot.

Under the changes of the decomposition of blood, normal animal glucose is very readily metamorphosed. The rapidity of the metamorphosis depends on the activity of the decomposition of the animal substances present, and when the destruction of the sugar is complete the blood has assumed an acid reaction.

This acid reaction of decomposing blood is only observable in that which was previously pretty largely impregnated with sugar. It appears to be owing to the formation of lactic acid. Certainly, it cannot be due to carbonic acid, for the reaction remains after exposure to a boiling temperature.

The disappearance of sugar in the manner just pointed out does not depend on the oxygen of the air, except in so far as this agent is concerned in exciting the decomposition of the azotized constituents of the blood; for the sugar disappears as rapidly when there is a small, as when there is a large amount of surface exposed to the air. But if the air be carefully and completely excluded, no signs of decomposition of the animal parts of the blood are to be observed, and under these circumstances the sugar also remains. The disappearance of sugar is more rapid where the fibrine and corpuscules are present, than when the serum is exposed alone; and in accordance with this, the blood in the one case undergoes decomposition much sooner than in the other—a fact easily intelligible from the greater amount of azotized ingredients present.

If blood normally impregnated with saccharine matter be placed aside until signs of incipient decomposition are observed, and the sugar is beginning to disappear, exposure to a current of oxygen rapidly completes the total disappearance of the saccharine constituent. In this observation we have a further illustration of the analogy that appears to exist, in the nature of the metamorphosis of sugar as a physiological process, and that which takes place chemically under the influence of an azotized compound, whose elementary particles are in a state of molecular transition. During life, the higher organic constituents of the blood are capable of undergoing the changes of assimilation on exposure to contact with oxygen, and there is a considerable destruction of sugar effected; for a short period after death these azotized constituents remain stationary and uninfluenced by oxygen, and with this, there is a corresponding suspension of the transformation of sugar; but, finally, the animal matter of the blood on contact with oxygen, especially during a warm temperature, assumes a state of decomposition, the molecular changes of which again excite the destruction or metamorphosis of saccharine matter.

The sugar *disappears far less rapidly* from diabetic blood under the influence of exposure to the atmosphere, than from healthy right-ventricular blood. From these, and a few other observations which he has yet been able to make on the blood in Diabetes Mellitus, the author, were he to hazard an opinion on the nature of that obscure disease, would be disposed to say that there appears to be a modification of sugar produced by the liver, which is not susceptible of undergoing the normal process of destruction in the animal system, and which, therefore, accumulating in the blood, is eliminated by the kidneys. The experiments of Bernard have shown that vegetable glucose (grape-sugar) is not susceptible of destruction in the processes of animal life, unless converted into animal glucose by the agency of the liver. Diabetic sugar would therefore seem to bear resemblance in its physiological relations to vegetable, rather than to animal glucose.—*Proceedings of the Royal Society*, vol. vii. No. 13.

USE OF SULPHATE OF MAGNESIA AS A SUBSTITUTE FOR SULPHURIC ACID.

Professor Ramon de Luca* has made some experiments to ascertain whether sulphate of magnesia, which is so abundant in Toledo, and at many places in Spain, can be employed in the production of hydrochloric acid, sulphate of soda, nitric acid, and chlorine.

The results which he has obtained are as follow :—

When an intimate mixture of two parts effloresced sulphate of magnesia, and one part chloride of sodium is heated, hydrochloric acid is evolved, and the residue consists, for the most part, of magnesia and sulphate of soda.

$$Mg\,O,\,SO_3 + HO + Na\,Cl = Na\,O,\,SO_3 + Mg\,O + H\,Cl.$$

When this residue is treated with water at 194° Fahr., the sulphate of soda dissolves, together with a small quantity of sulphate of magnesia, which may easily be separated by lime.

A mixture of two parts sulphate of magnesia and one part nitrate of potash or

* *Annalen der Chemie und Pharmacie*, October, 1855.

soda, yields, when slowly heated, nitric acid, together with nitrous vapour and a residue of sulphate of potash or soda with magnesia.

$$Mg\,O,\,SO_3 + HO + NaO\,NO_5 = NaO\,SO_3 + Mg\,O + No_5\,HO.$$

200 grammes nitrate of soda ignited with 400 grammes sulphate of magnesia, gave 90 grammes nitric acid, containing 58 per cent. NO_5.

Chlorine may be obtained by heating a mixture of chloride of sodium, peroxide of manganese, and sulphate of magnesia.

These reactions indubitably depend upon the inferior stability of the magnesian chloride and nitrate as compared with those of the alkaline and earthy metals.

Since sulphate of lime under the above conditions would yield a chloride that is far more persistent, and a nitrate that is decomposed only at a temperature which produces decomposition of the acid itself, gypsum cannot be substituted for sulphuric acid in the same manner as sulphate of magnesia.

MEANS OF PREVENTING THE DECOMPOSITION OF POTASSIO-TARTRATE OF ANTIMONY IN SOLUTION.

Harms* states, that the decomposition of this salt in solution is prevented by an admixture of alcohol. He recommends that the salt should be dissolved in fifty parts of water, and that ten parts of alcohol should be mixed with the solution.

A NEW METHOD OF DETECTING ADULTERATIONS OR MIXTURES OF COFFEE AND CHICORY.

Mr. John Horsley, of Cheltenham, in a paper read at the Meeting of the British Association, at Glasgow, proposes the following method of detecting the mixture of chicory with coffee. He observes—"Bichromate of potassa will be found to produce no discoloration of an infusion or decoction of chicory; on the other hand, the *most dilute* solution of coffee gradually becomes changed to a *deep porter-brown colour*, which is not at all connected with the colouring matter of the coffee, but with the gallic acid existing in the berry, as a decoction of the unroasted berry will produce a similar result:" this serves to distinguish the substances in the *pure* state. For mixtures of the two, the following approximative test is given:—Add to the mixture of chicory and coffee, which has been boiled with the bichromate of potash, a few grains of sulphate of copper, and thenboil the liquid, when a flocculent precipitate of a more or less deep sepia brown colour is formed—the intensity of which varies with the quantity of coffee contained—from which, by a series of experiments with known quantities, it is easy to adjust a *graduated standard of tints* as follows:—

All Coffee.	Three-quarters Coffee.	Half Coffee.	Quarter Coffee.	All Chicory.

The author has also applied the same salt to the detection of the iodine of the alkaline iodides, in experimenting on which he found that the iodine was completely precipitated in a pure and crystalline form. On investigating the matter he found that for every equivalent of iodine so precipitated, it required an equivalent of the chromic salt with the addition of *free* acid. For instance, dissolve twelve grains of iodide of potassium together with eight grains of the bichromate of potassa in one ounce of water, and mix with it sixteen grains of oxalic acid dissolved in another ounce of water—*agitate* the two solutions well for a minute or two with a glass rod; the iodine will be thrown down as stated, leaving but a mere trace of iodine in the solution. Sulphuric or hydrochloric acid would answer equally well. The use of the chromic salt in the manner suggested furnishes not only an invaluable test of the presence of iodine, but an excellent means of *estimating* its quantity.

From the readiness with which pure iodine can thus be obtained, it occurred to Mr. Horsley that the same might be applied to its manufacture commercially, but from the complicated nature of kelp lyes it was exceedingly difficult.

---

* *Annalen der Chemie und Pharmacie*, October, 1855.

THE PLATE LICENCE.

An extract from a local newspaper informs us, that an informer has been active at Whitby, in Yorkshire, among Chemists, tobacconists, ironmongers, and the dealers in ornaments, and has laid informations against upwards of thirty individuals for selling goods silver mounted, capped smelling bottles, canes, chains, ornaments, &c., without having taken out a plate licence. The weight of silver required to incur liability is five pennyweights. We intend to make further inquiries on this subject, and revert to it next month.

SCALE OF MEDICINES FOR MERCHANT SHIPS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In the recently published *Scale of Medicines and Medical Stores*, issued by the Board of Trade, there is one article ordered to be supplied regarding which some explanation is evidently desirable.

I allude to *Nitric Ether*.—Now Nitric or Hypo-nitrous Ether is a preparation but rarely kept in stock by English Druggists. In Scotland and Ireland such, perhaps, may not be the case, as in the Edinburgh and Dublin Pharmacopœias it is ordered to be used in the preparation of sweet spirit of nitre.

But supposing it easily obtainable, which it would be, doubtless, if a demand should exist, can it be intended that a liquid which is highly prone to decomposition, *which boils at* 70° Fahr., and which requires the nice conveniences of a laboratory to keep, shall be sent out in ship medicine chests going to all climates of the globe ?

If Nitric Ether is ordered through a misprint, and *Spirit* of Nitric Ether is intended (albeit the quantity, *two ounces*, for *fifty persons or more*, is marvellously small), I trust the typographical error, now that attention is called to it, may be rectified before the new *Scale of Medicines* comes into force.

I am, Sir, your obedient Servant,

London, Nov. 9, 1855. Pharmacopola Londinensis.

EARLY CLOSING MOVEMENT.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In Mr. Abraham's address to the "Members of the Liverpool Chemists' Association," he alluded to the partial failure of the Early Closing Movement in that town. Liverpool, I am sorry to say, is not the only place in which it has failed. The reason I believe is pretty well known—too great a watchfulness after our neighbours ! instead of closing our shop doors, putting out lights, &c., and betaking ourselves to the comforts (these cold winter evenings) of our snug parlours. At Hammersmith, I am pleased to say, it has met with a very different fate. The movement was set on foot in October, and up to the present time it has perfectly succeeded.

Three of the gentlemen, at starting, were anxious to make it eight o'clock instead of nine. That, I think, would have been too great a transition, and not so likely to have been carried out.

All I have since spoken to on the subject are delighted with the change. I enclose the resolution we advertised, and the remarks made thereon by the local press, trusting the importance of the subject, both to the employers and the employed, will be a sufficient apology for the length of my communication.

I am, Sir, your obedient Servant,

Hammersmith, November 19*th*, 1855. E. Groves.

"Notice !—The Chemists in Hammersmith having unanimously resolved to close their shops from Monday, the 29th day of October, 1855, until the 1st of April, 1856, at nine o'clock in the evening (except Saturday, on which day it will be eleven) —Sundays as heretofore from a quarter to eleven A.M. until six P.M., and finally at nine—the public are therefore respectfully and earnestly solicited to apply for medicines, &c. &c., before the above-named hours ; at the same time, they (the Chemists) wish it to be understood, that in all cases of emergency medicine may be had at any hour."

BOOKS RECEIVED.

Chimie appliquée à la Physiologie et à la Therapeutique. M. Mialhe. Presented by the Author.

The Art of Perfumery, and the Methods of obtaining the Odours of Plants, *with Instructions for the Manufacture of Perfumes for the Handkerchief, Scented Powders, Odorous Vinegars, Dentifrices, Pomatums, Cosmetiques, Perfumed Soap, &c.* By G. W. Septimus Piesse, Analytical Chemist, &c. To which is added an Appendix on the Colours of Flowers, Artificial Fruit Essences, &c. London: Longman, Brown, Green, and Longmans, 8vo, 1855. Presented by the Publishers.

Many of the articles in the above work have appeared before in the *Annals of Chemistry and Pharmacy.* They are now brought together, and with additional matter, and illustrated with many engravings, form an elegant and useful little volume.

The Medicinal and Economic Properties of Vegetable Charcoal, *with Practical Remarks on its Use in Chronic Affections of the Stomach and Bowels.* By James Bird, M.R.C.S., 8vo, pp. 82. John Churchill.

This work contains a brief history of the progress of the trials of charcoal as a remedy for disorders of the alimentary canal, with the opinions of various medical authorities on the subject. Cases are quoted in illustration of its effects. Without offering any opinion as to the medical merits of the work, we have only to observe, that if the efficacy of charcoal should be established, the biscuits will come into demand with Chemists as well as Bakers.

TO CORRESPONDENTS.

J. F. (Banhead).—Solution of bimeconate of morphia is intended. ℞ bimeconate morphia ℈ss, rectified spirit f℥i, distilled water f℥×iij. There is no authorized formula.

Excelsior (Sunderland).—(1). *Warburgh's Tincture.*—There is no formula in the Austrian Pharmacopœia. It is said to be made as follows:—Aloes, zedoary, each ℈ij, camphor, angelica root, each gr. ij, saffron gr. iij, proof spirit ℥iij; add sulphate of quinine gr. vi to every ℥v of the tincture.—(2.) No.—(3.) Uncertain.

J. F. R. (Warrington).—*Tinct. Quinæ Co.*—See the London Pharmacopœia. The proportion is ℈×vj to Oij.—(2.) *Decoction of Matico,* Matico leaves 1 oz., water Oj. Boil for ten or fifteen minutes, and strain.

Chemica. (Stratford-on-Avon).—(1.) See vol. vii., No. 7.—(2.) Möhr and Redwood's *Practical Pharmacy.*—(3.) No.

J. (Pontefract.)—See Pereira's *Materia Medica.*

Juvenis (Holborn).—(1.) We never heard of such a process.—(2.) Vol. ix., page 343.—(3.) Taraxacum root, dried and roasted in the same manner as coffee, and mixed with coffee in any proportions that may be desired.—(4.) *Effervescing Citrate of Magnesia:*—A preparation under this name is made by mixing 14 parts of citric acid, carefully dried with 10 parts of dry carbonate of magnesia.

A Registered Apprentice (Narbeth).—(1.) Benzin (or benzol) is the best preparation for removing grease stains from paper, silk, or any other fabric.—(2.) Yes.

H. D. (Dublin).—Tincture of benzoin is generally used for the last coating of court plaister.

M. P. S. (Kent).—Sulphate of copper, absolutely pure (although better than the common), would be too expensive for ordinary use in soaking wheat. That which contains *a little* sulphate of iron is found practically to answer the purpose.

Quœsitor (Scotland).—The Students' number of the *Lancet* (for September 15th) contains the information required respecting medical education. Preliminary education in Pharmacy is useful, but would not materially diminish the expense.

Juvenis (Leeds).—See Pereira's, or any other work on Materia Medica.

An Apprentice (Yeovil) inquires whether a Druggist can oblige his apprentice to clean shop windows? [Such an apprentice is fit for nothing else, judging from his writing and spelling.]

W. E. (Southampton).—The subject will be noticed next month.

Himalaya.—We recommend the recrystallization of the salt two or three times. When deposited from a solution free from other saline matter, the crystals will not be subject to the defect alluded to.

A Subscriber (Weston-super-Mare).—Some specimens of opium afford results such as described. In such case the opium should be changed.

M. P. S.—Dispensers for the Crimea are examined by Mr. Savory, of Bond Street.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, Secretary, 17, Bloomsbury Square, before the 20th of the month.

THE PHARMACEUTICAL JOURNAL.

VOL. XV.—No. VI.—JANUARY 1st, 1856.

CRIMINAL POISONING.

Murder has become like mathematics, or chemistry, "an exact science." Ingenuity, skill, and forethought are exerted to the utmost; every artifice which the law can interpose to frustrate the intentions of the Legislature is deliberately resorted to by the perpetrator of this crime. When all these efforts to evade the ends of justice are found ineffectual, and the evidence of guilt is such as to lead to a conviction, all the circumstances of the case are published, and the causes of failure are pointed out and discussed for the information of any future criminal, who, by avoiding similar mistakes, may more successfully carry his diabolical intentions into effect. While these complications of art and science are brought to bear in aid of the woman who is tired of her husband, or the man who wishes quietly to dispose of an inconvenient friend or relative, the same weapons are available on the other side; and fresh modes of detection are from time to time brought to light. Thus the clumsy method of poisoning by large doses of arsenic has been, to a great extent, superseded by the substitution of poisons less easily detected, or by the administration of doses so minute as to spread the deadly process over weeks or even months.

It may be doubted whether the publication of the details of such cases ought to take place in the public newspapers, or whether these matters should not be confined to scientific or professional works. Knowledge is power, and the circulation of such information places in the power of a large number of persons the means of destruction which would not otherwise have occurred to them. It is a notorious fact that the publication of the particulars of a murder or a suicide is not unfrequently followed by the perpetration of a similar offence by some other party, apparently assisted, if not instigated, by the information so received.

On the other side, it has been remarked that the suppression of such facts and circumstances from the public journals, even if it were possible, would be no security against the prevalence of the crime among persons of education and good position in society. From the palace to the cottage, on the highway, in the laboratory, and even in the medical profession, there is no security against the depravity of human nature. In fact, laws have been enacted in some European states for the express purpose of guarding against poisoning by medical men. With this view, as well as for the greater security of the public in other respects, medical practitioners are prohibited from dispensing their own prescriptions, which are taken to the Pharmacien, and the original kept by him to be produced as evidence in case of need. Such precautions fortunately have not been found necessary in this country, and the profession, on which we depend for comfort and relief under all circumstances of mental or bodily illness, is usually considered to be altogether beyond suspicion. The case at Rugeley is a rare exception, and if there be any foundation for the rumours which have been currently circulated, it is one which stands alone. No precautions which the law could enforce or prudence suggest could be effectual in preventing crime under such circumstances. There are, however, some facts connected with it which are interesting in a scientific point of view, and which should be recorded for future reference. After the publicity which has been given to the mode in which the crime is supposed to have been effected, great care is necessary in the sale of strychnia, which should never be retailed to any persons except medical men personally known to the vendor.

We have received from a correspondent the subjoined remarks on

THE SLOW-POISONING CASE AT BURDON.

In former times the great difficulty which Medical witnesses had to encounter on trials for criminal poisoning, was to establish to the satisfaction of the Court and jury that the deceased had really died from poison. Either poison was not detected by chemical analysis, or, if detected by the rude processes then available, the ingenuity of counsel engaged for the defence was displayed in baffling medical testimony, by showing that the deceased might have died from some natural cause, and not from poison.

The difficulty now experienced consists not so much in proving that poison exists in the body, and that it will account for death, as in demonstrating to the satisfaction of the Court the mode by which it entered the body, and by whose agency the crime was perpetrated. In other words, a conviction for murder by poison now generally fails, owing to the difficulty of proving that the poison was administered by the accused. A dagger or a pistol may furnish evidence to establish the identity of an assassin. In poisoning, the instrument of murder can rarely furnish conclusive evidence against a person accused of the crime. It is, indeed, a well-known fact, that evidence of the administration of poison must always depend on circumstances, and unless the circumstances be minutely sifted and placed in their true light before a jury, the murderer by poison may easily set at defiance all human laws.

The Burdon case, which has excited so much interest in the minds of the public and profession, presents some remarkable features in the history of crime. That Mrs. Wooler, the unfortunate victim in this case, died from the effects of arsenic, admits of very little dispute. All the medical witnesses agreed on this point. The symptoms during the whole progress of her illness, extending over a period of about seven weeks, were such as would be produced by small doses of arsenic taken at intervals. The arsenic was found in the urine voided during life, and in all parts of the body after death. The slight disease of the lungs, and the morbid condition of the liver, would not, in any way, explain the symptoms under which the deceased laboured, and still less would they suffice to account for her death. The learned counsel for the defence did not dispute this point. The evidence, in fact, was, in this respect, too strong to be contested. This being admitted, the next inquiry is, "Who administered the poison?"

It was quite clear, from the condition of the unfortunate lady, that she did not take the poison knowingly or consciously; there was no pretence for the hypothesis of *suicide*. Suicides by arsenic do not take this poison in divided doses, extending over a period of many weeks. For some time preceding her death, the deceased took neither food nor medicine except that which was given to her by her attendants; and, lastly, the poison was found in a *syringe* which had been employed, not by herself, but by others, during the greater part of her protracted illness, for the purpose of supplying nourishment to her wasted frame, and for checking the diarrhœa under which she laboured. These facts furnish an answer to another hypothesis which we have heard broached concerning this lady's death, namely, that she had secretly adopted the practice described by Von Tschudi, as prevalent among women in Styria, namely, of taking small doses of arsenic in secrecy, for the purpose of improving her personal appearance, and making herself more attractive in the eyes of a husband whom she fondly loved.* Is it necessary for us to deal seriously with another hypothesis, equally absurd, that the arsenic found in the viscera of the deceased might be normal arsenic—a natural constituent of the human body? As no person having even a moderate knowledge of physiology, pathology, or chemistry, can hold this view, it is not worthy of notice. We shall only observe, that it would be more reasonable to assign the presence of arsenic to epigenesis or the metamorphosis of tissues during life.

We thus arrive at two conclusions, that this lady died from arsenic, and that she did not take it knowingly. Was the poisoning the result of *accident?*

The answer to this question, so far as the medical gentlemen in attendance on the

---

* See on this subject *The Chemistry of Common Life*,—"The Poisons we Select," vol. ii., p. 201. It is to be regretted that a Chemist of the position and attainments of the late Professor Johnston, of Durham, should have given circulation to such absurd tales as these. They do not require serious refutation.

deceased are concerned, is very simple. The whole of the bottles and packets in which the medicines were sent were in the custody of persons in the house. After they had once left the hands of the medical men, they had no control over them. The witness, Ann Taylor, the confidential servant of the deceased, stated in her evidence that none were broken or destroyed, but all that could be found were collected after the death of the deceased, and carefully preserved. These, to the number of seventy, including those in which the injections were sent, were examined for arsenic. They contained no trace of this poison. Therefore it follows, if accident had any share in the result, it must have occurred between the delivery of the medicines and their administration to the deceased; but how can it be admitted that there should be an *accidental* administration of small doses of arsenic day by day, or at intervals of a few days, over a period of several weeks? Accidental poisoning is generally revealed either by a large dose of arsenic, followed by severe symptoms and rapid death, or by symptoms of a temporary kind and recovery. In this case the symptoms had only remissions over a very long period. No conceivable accident could have had this duration! The attention of the medical men was drawn to the existence of symptoms of poisoning three weeks before death, and this would have rendered them all the more watchful of any accident which was likely to occur; but the theory of accident has as little support from the circumstances of the case as the theory of suicide.

How was the poison administered? It must have been either in the food or medicine. The vessels in which the food was cooked and the injections prepared, were of sheet iron. There was no arsenical or other glaze about them. They were such as are ordinarily used in houses, without any of the results of arsenical poisoning being observed.

The medical gentlemen, whatever may have been their indiscretion in keeping their suspicions of poisoning concealed during a period of three weeks, are completely exonerated by these facts from any participation in the administration of arsenic to the accused.

The symptoms of poisoning, according to the evidence, were first manifested about the middle of May, but it was not until the 8th of June that a suspicion arose that poison was the cause. It does not appear that injections were used until about this date, and assuming that the early symptoms were caused by arsenic, some of the poison must have been taken by the mouth; hence those about the deceased who were in the habit of giving her food or medicine, must, either knowingly or unknowingly, have administered arsenic. There was no proof of the possession of poison by any one about the deceased, if we except the discovery of an ounce bottle, labelled "Fowler's Solution," containing a small quantity of liquid. This was in a basket with other medicines belonging to Mr. and Mrs. Wooler, and to which it appears they both had access. This bottle had disappeared before the inquest. It is right to state, that when seen on two different occasions, there was the same quantity of liquid in it. Although labelled "Fowler's Solution," there was nothing to show that the contents of the bottle consisted of this preparation. Hence, strictly speaking, the possession of arsenic was not traced to the accused, nor to any one about the person of the deceased. All who had dispensed medicines for her were called, and they clearly proved that no arsenical preparation had been at any time used by them.

The main fact in favour of the accused relied upon in the defence and in the summing up of the learned judge, was, that there was *no motive*. The same remark will apply with equal force to every individual who was around the deceased. The only medical fact which bore apparently with any force against the accused, was not placed before the jury by the learned judge. There was arsenic in a pewter syringe, identified as that which belonged to the accused, and proved by the witness Ann Taylor to have been constantly used by him and herself in administering injections. A brass syringe borrowed by the prisoner had been previously tested, and arsenic was pronounced to be present in it. It was afterwards found, however, that arsenical muriatic acid had been used in testing it, and therefore the result could not be relied on. Two other syringes found on the premises were subsequently tested by pure materials, and in one of these, a pewter syringe already referred to, the only one used, arsenic was detected! There was no arsenic in the metal.

In the address made by the learned judge to the jury, the mistake respecting the arsenic in the brass syringe (the borrowed one) was placed very prominently before

them; but the fact regarding the positive existence of arsenic in the pewter syringe (the prisoner's own) was not even adverted to; it was passed over as an unimportant circumstance! But it is surely important to consider how the arsenic got into the prisoner's syringe, and who used it. We have heard it suggested that, by a reversed action of the valves, some of the fluids of the rectum might have been drawn into the tube. This far-fetched hypothesis will not, however, explain the facts: the fluids secreted from the lower bowels could not have been, under the circumstances, so saturated with arsenic as to account for the result. The deceased was undergoing chronic poisoning as a result of absorption, not acute poisoning from a large quantity of arsenic, taken at a dose, of which the surplus would be mechanically discharged through the rectum. There is no theory to explain this fact, except that fluid containing arsenic must have been used in the syringe, and a portion retained. It appears, from the evidence, that the injections were administered to the deceased by Mr. Wooler (the accused) and by Ann Taylor, the confidential servant. On two occasions only the latter was assisted by Miss Lanchester, a friend of the deceased.

Such are the medical facts regarding the administration of poison in this case: the proof could be carried no further. Had the fact of the discovery of arsenic in the syringe used by the prisoner been laid before the jury, instead of being passed over altogether, it might not have affected their verdict; but it would have probably been more satisfactory to the public. The jury have pronounced the prisoner, under the direction of the judge, to be an innocent man wrongly accused of the crime of murder. Still the fact remains: Mrs. Wooler has died from the effects of arsenic, apparently administered in injections by those about her; the administration being in small doses, extending over a period of several weeks. The learned judge, however, openly stated that this administration had not been without full consciousness on the part of some person not directly indicated. It is unfortunate that, by this remark, a heavy weight of suspicion is made to rest upon persons undoubtedly innocent of this foul and unnatural crime.

ANALYSIS OF THE SANITARY COMMISSION.

It would have been much more satisfactory to us to be able to eulogise and promote, than in any way to disparage, a project, the professed object of which is the suppression of dishonest practices. Even the appearance of opposition to so laudable an undertaking, places us, for the time being, in a false position, and has, in fact, been made the pretext for misrepresentation. But we are not misled by mere professions, and when we see exaggerated, unfair, or garbled statements ostentatiously circulated for the purpose (as we are told) of warning the public against *fraud*, the question naturally suggests itself, whence arises this great eagerness to operate on the public fears? Would not a plain, honest statement of facts have been sufficient without such high colouring, and a meretricious appeal to the imagination?

It is quite time that the real nature, parentage, and object of the Analytical Sanitary Commission should be understood.

Ushered into the world with a boast of self-sacrificing philanthropy, and a parade of disinterested zeal for the public good, it has been gradually shorn of its fair proportions, until it is assuming what we believe will prove to be its true character. Had the welfare of the public been the object in view, the leaders of the movement might have congratulated themselves on their success in having invested the subject with so much popularity as to engage the attention of the Legislature, and lead to the appointment of a Committee of the House of Commons. A triumph more signal and satisfactory, in so short a space of time, could scarcely have been desired by disinterested servants of the public; and if they had kept their own counsel, all parties concerned would also have received, in due time, their share of credit and reward. Armed with "the truth, and nothing but the truth," extending the right hand of fellowship to all the sincere opponents of fraud in every shape, and aiming at nothing but the public advantage—the Commission *might have become* the nucleus of a reformatory

association with which all honest men might have been proud to be identified. Such a result we at one time, by a strong effort of imagination, saw looming in the distance. This, however, was but a transient delusion.

In a ludicrous quarrel about a testimonial the pomp of public duty was forgotten, and the adulterators of food and drugs enjoyed a respite while their assailants joined issue in an attack upon each other. Dr. Hassall, or his friends on his behalf, threw down the gauntlet, and came forth as the great Sanitary Phenomenon to whom the honour was due. The arrogance of an *employé* in claiming credit for work for which he had been retained and paid, was resented by the Editor of the *Lancet;* and the compact being broken, the public obtained a peep behind the scenes. Conflicting rumours, seasoned with personalities, enlivened the performance; other aspirants for a share of the laurels joined in chorus; and the statements of numerous witnesses, although contradictory on some points, afforded abundant evidence as to the real nature and object of the Commission. The tables were turned, and the self-appointed exponents of fraud found themselves suspected, if not directly accused, of attempting to raise capital by means of the licence of the press operating on private character and public fears.

Those who knowingly, or from culpable ignorance, furnish to the public that which is spurious or adulterated, are guilty of fraud varying only in degree; but the man who sets himself up as judge and jury, with a view of exposing to disgrace and obloquy any persons whom he may think proper to stab in the dark, must be prepared to have his skill and competence for such a duty submitted to a test as severe as that which he applies to others. Whether the Analytical Sanitary Commission will stand this test, or whether the published reports may be classed with the spurious specimens which they profess to describe, is a question which we leave time and our readers to determine. The identity of the Commission is still a mystery. When a testimonial is wanted, Dr. Hassall is the Commission, and the canvass for subscriptions is active. When his qualification as a chemist is disputed, we are told that he is not the Commission, but was assisted by competent persons. Why, then, is no testimonial to be given to these competent persons? Is it because Dr. Hassall remunerated them for their services? On that ground the testimonial is due to the Editor of the *Lancet*, who remunerated Dr. Hassall. This question, however, is of minor importance, and we only allude to it with a view of throwing light on the real question at issue—namely, who is the Analytical Sanitary Commission? Upon whose authority have upwards of 2000 persons been individually charged with fraud? If the office of public accuser brings with it a testimonial, it also has its responsibilities, from which the recipient has no right to shrink.

The mysterious incognito, in the first instance, invested the Commission with a fictitious importance favourable to the development of its resources, and calculated to extend its powers. But the disposition which was soon manifested to trade upon the fears of the public stinted it in its growth, and as each new phase of its speculative tendency appeared in view, it shrivelled by degrees until it arrived at its present attenuated and imponderable condition. The term "Sanitary Commission" has now acquired a kind of "amphibious" meaning, and is understood to denote a commercial project, floating on the prestige of an *ad captandum* title.

We hear of the "North London Sanitary Commission," the "Metropolitan Sanitary Commission," &c., &c., establishments where patent medicines and other articles in a state of "absolute purity" may be obtained, and where food, water, &c., may be taken for analysis for the good of the public. We also meet with rival institutions rejoicing in the title of College of Health, and founded on the principles of the celebrated Professor Morison. Dr. Coffin with his vegetable blessings brings up the rear of the motley group, who under various names and pretexts enter the lists as disinterested public benefactors, each adopting the usual motto of empirics—"All others are impostors."

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

LIST OF MEMBERS, ASSOCIATES, AND APPRENTICES (*continued*).

MEMBERS.

Barnstable	Wills, Thomas Doidge
Brixton	Wrangham, John
Chester	Grindley, Robert Dutton
Henfield	West, William
Manchester	Atkinson, Mathew
	Pyne, Joseph John
Oxford	Prior, George Thomas

MINOR EXAMINATION.

Booth, Henry	Rochdale	Richardson, John G. F.	Longton
Brevitt, William Y.	Birmingham	Stedman, James	Lower Tooting
Cross, William	Bristol	Tyrrell, John W.	Norwich
Ford, Charles	Reading	Watton, Edward	Manchester
Goddard, George	Lowestoft	Yates, Francis	London
Johnson, Benjamin M.	Collumpton		

REGISTERED APPRENTICES.

NAMES	RESIDING WITH	TOWNS.
Andrews, Enos	Mr. Cropper	Long Sutton
Beach, Thomas	Messrs. Lea and Co.	Great Malvern
Bennington, William	Mr. Mortimer	Sidmouth
Birch, Henry C.	Mr. Clarke	Richmond
Cartner, David	Mr. Bell	Carlisle
Chapman, Francis C.	Mr. Green	Droitwich
Clarke, Willoughby	Mr. Brown	Oxford
Holt, George F. W.	Mr. Obbinson	Sleaford
Jakins, George S.	Mr. Golding	London
Paxton, William M.	Mr. Mitchell	London
Sanger, William A.	Mr. Maitland	London
Tuck, John	Mr. Martin	Trowbridge
Wheeler, Joseph	Mr. Owen	Holloway
Yerworth, Edmund	Mr. Binge	Pimlico

PHARMACEUTICAL MEETING,

Wednesday, December 5th, 1855,

MR. DAVENPORT, PRESIDENT, IN THE CHAIR.

The following donations were announced:—

The Journal of the Society of Arts, from the Society.
The Journal of the Photographic Society, from the Society.
The Literary Gazette, from the Publishers.
The Chemist, from the Publishers.
The Medico-Chirurgical Transactions, from the Society.
The Histological Catalogue, vol. ii., from the College of Surgeons.
The Post Office Directory, 1855, from Mr. Hains, Upper Albany Street.
On the Composition of Bread, from Dr. Maclagan.
Two samples of astringent Gum from Australia, from Mr. Low.
Samples of Ether and Chloroform, prepared from Methylated Spirit, from Mr. Macfarlan.
Sample of Glycerine, sp. gr. 1.285, from Mr. Whipple.
Sample of Artificial Sea Water, from Mr. Hains, Upper Albany Street.
Wooden Boxes, various sizes, made by machinery, suitable for Lozenges, Arrow-root, &c., &c., from Mr. Robertson, Holloway Tin Mills.

The following paper was read:—

ON THE ADULTERATION OF ANNATTO.

BY ARTHUR H. HASSALL, M.D.,
Author of "*Food and its Adulterations.*"

Annatto is a colouring matter, obtained from the seeds of a plant named *Bixa orellana*, L., and which forms the type of the small natural order *Bixineæ*. It is a native of South America, the West and East Indies; but the article annatto is chiefly prepared in Brazil and Cayenne.

The tree is an evergreen, and the seeds are enclosed in pods, the colouring matter being situated on the outside of the seeds.

It appears that two different processes are pursued in order to separate the colouring matter. According to the ordinary process, the seeds, after being removed from the pods, are bruised, transferred to a vat, when they are mixed with as much water as covers them. Here they are left for several weeks or months. "The substance thus obtained," Dr. Ure states, "is now squeezed through sieves, placed above the steeper, that the water containing the colouring matter in suspension may return into the vat.

"The residuum is preserved under the leaves of the Annana (pine-apple tree) till it becomes hot by fermentation. It is then again subjected to the same operation, and this treatment is continued until no more colour remains.

"The substance thus extracted is passed through sieves, in order to separate the remainder of the seeds; and the colour is allowed to subside. The precipitate is boiled in coppers until it is reduced to a consistent paste. It is then suffered to cool, and is dried in the shade."*

The second process is that recommended by Leblond. He proposes simply to wash the seeds until they are entirely deprived of colour, to precipitate the colouring matter by means of vinegar or lemon-juice, and to boil it up in the ordinary manner, or to drain it in bags, as is practised with indigo. The annatto prepared in this way is said to be four times as valuable as that prepared according to the first-described process.

It does not appear from either of these descriptions that anything is added to the annatto except water. This is important with reference to its adulteration.

The pulp surrounding the unfermented fresh seeds was found by Dr. John to consist of 28 parts of colouring resinous matter, 26.5 of vegetable gluten, 20 of ligneous fibre, 20 of colouring, extractive matter 4, formed of matters analogous to vegetable gluten and extractive, and a trace of spicy and acid matters.

The colouring matter is soluble in water, but more so in alcohol and alkalies. The latter change its colour somewhat from red to orange. When annatto is used as a dye, it is cut in pieces and boiled in a copper with crude pearl ashes.

Annatto is used by dyers, painters, soap-makers, and to colour milk, butter, and cheese.

By dyers and soap-makers it is frequently purchased for use in the state in which it is imported, these parties adding the alkali as a solvent as they use it; in these cases it does not pass through the hands of the English so-called manufacturers at all. In other cases the manufacturers re-prepare it in the several forms of roll, cake, orange, black, and fluid annattos.

Before proceeding to enter upon the question of the adulteration of any article, the first step that is necessary is to make oneself acquainted with its properties and characteristics; and if the substance be vegetable, it is requisite that we should determine its structure, by means of the microscope. We thus obtain certain fixed data or standards of comparison from which to start.

Subjecting the seeds of annatto to examination with the microscope, I find that their outer or red portion does not exhibit any very definite structure,

* *Dict. of Arts, Manufactures, and Mines*, p. 48.

that the surface of the seed proper consists of narrow or elongated cells or fibres, disposed vertically to the surface of the seeds; while the inner white portion consists of cells filled with numerous starch corpuscles, well defined, of medium size, and resembling in form and in the elongated hilum the starch granules of the pea and bean.

In *genuine* manufactured annatto but little structure is met with; portions of the outer cells are however seen, as well as, in those specimens which in the course of their preparation have not been subjected, as they usually are, to the action of boiling water, a few of the starch corpuscles.

Annato then in the manufactured state presenting so few evidences of structure, it is a very easy matter, indeed, by means of the microscope, to detect the presence in it of most foreign vegetable substances, as turmeric powder, and the starch of wheat, rye, barley flour, and sago meal.

On subjecting the seeds of annatto to examination, I obtained an ash which weighed 4.80 grains per cent., and which was nearly white, with here and there a faint tinge indicating the presence of a mere trace of iron. On subjecting this ash to analysis it yielded .20 of a grain per cent. of alumina, tinged only very slightly with iron.

The red or outer part of the seeds yielded on examination nearly similar results.

These results may, therefore, as we shall see more fully hereafter, be taken as representing to some extent the proper weight of the ash of genuine annatto, and of the quantity of iron and alumina which it contains.

I will now proceed to describe the results of the Microscopical and Chemical examination of *Thirty-four* samples of annatto, *as imported*, *as obtained from English manufacturers*, *and as purchased from dealers*, in this article, which is sold by most oil and colourmen, and by some chemists.

I may state that I have here the names and addresses of all the parties of whom purchases were made. I would also observe that the descriptions of the results of the examination and analysis of the majority of the samples are in the handwriting of Mr. Henry Miller, who has been dead for some months. I have now merely introduced descriptions of a few additional specimens, and made certain additions to the descriptions as they originally stood. I mention this in order that the Society may have some idea of the labour which I had long since bestowed upon this subject in order to ascertain the facts connected with it.

ANNATTO AS IMPORTED.

1*st Sample.*—Portion of large cake purchased at a public sale, by a soap manufacturer:—*Mass*, bright red, rather soft; *ash*, pale grey, amounting to 4.44 per cent.; and containing decided traces of *lead; alumina* tinged with *iron* .30 of a grain per cent.

2*nd Sample.*—Portion of cake obtained from a cheese-factor:—Bright red, soft, *ash* white, amounting to 5.20 grains per cent.; *alumina* tinged only with *iron* .40 of a grain.

3*rd Sample.*—Part of cake used by a cheese-factor:—*Mass*, red and moist, *ash* rather ferruginous, green at bottom, alkaline, and amounting to 9.48 per cent.; and containing one grain of *iron* and *alumina*.

4*th Sample.*—Portion of cake received from a wholesale chemist and druggist:—*Mass*, bright red, of about the consistency of dough, *ash* amounting to 12.70 per cent., white, but here and there, somewhat ferruginous, and consisting in part of *salt*, *alumina*, 1.1 per cent., tinged only with *iron*.

5*th Sample.*—Portion of cake from soap factory:—*Mass*, dark red, firm, with white specks here and there, *ash* weighing 16 grains per cent., deep brown, and very ferruginous, *iron* and *alumina*, amounting to 2.20 grains.

Of these five samples, Nos. 1 and 2 contained no intentional admixture; No. 3 contained a small quantity of *alkali*, potash or soda; No. 4 *salt*; and No. 5 *some ferruginous earth*. In none of the samples was any foreign vegetable substance detected.

AS OBTAINED FROM MANUFACTURERS.

6*th Sample.*—*Mass*, dark coloured, soft, and of a pasty consistence; *ash*, reddish black, very ferruginous, green at bottom; very alkaline, amounting to 32.50 per cent.; and consisting of *alkali*, potash, *chalk*, and some *red iron earth*, *iron* and *alumina* 2.70 per cent.

7*th Sample.*—Portion of small cake, brown, dry, hard, and heavy:—*Ash*, very ferruginous and very alkaline, amounting to 35.56 per cent.; and consisting of *alkali*, and *an iron earth; iron* and *alumina* 3.26 per cent.

8*th Sample.*—Bright red, of the consistence of paste, salt to the taste, deliquescent, and very gritty, contains an immense quantity of *wheat flour*:—*Ash*, amounting to 17.12 per cent.; and consisting of *salt* and some *coloured earth; iron* and *alumina* 1.70 per cent.

9*th Sample.*—Brilliant red, of soft consistence, contains a very large quantity of *wheat flour*:—*Ash*, ferruginous, amounting to 14.06 per cent., and consisting partly of *sulphate of lime, salt; iron* and *alumina* 1.32 per cent.

10*th Sample.*—Dry, hard, and of an orange colour:—*Ash*, yellowish at bottom, amounting to no less than 62 per cent., and consisting principally of carbonate of lime or *chalk*, with about 9 per cent. of *sulphate of lime*, and *a ferruginous earth; iron* and *alumina* 3.20 per cent., with .30 of a grain of *oxide of lead.*

11*th Sample.*—Portion of small cake, hard, dry, very heavy, and of an orange colour:—*Ash*, amounting to no less than 57.72, and consisting chiefly of *carbonate of lime* or *chalk.*

12*th Sample.*—Portion of small cake, stamped "Extra Superfine Annatto," of an orange brown colour, gritty, and contains a very large quantity of *turmeric*, *sand*, or *earth*, and a little *wheat flour:—Ash*, highly ferruginous, somewhat caustic, amounting to 44.4 per cent.; and containing *alkali*, *chalk*, and *a ferruginous earth; iron* and *alumina* 2.70 per cent.

13*th Sample.*—Portion of small cake, dry, hard, and very heavy, and of an orange brown colour:—*Ash*, amounting to no less than 63 per cent., and consisting principally of *chalk*, with some *sulphate of lime.*

AS PURCHASED OF RETAIL DEALERS.

14*th Sample.*—Portion of small cake, dry, hard, brittle, and ponderous, contains a good many starch granules of *sago*, altered by heat:—*Ash*, grey, yellow at bottom, and amounting to no less than 57.80 grains per cent., consisting principally of *chalk.*

15*th Sample.*—Portion of small cake, soft, moist, gritty, ponderous, and of an orange brown colour, contains a very large quantity of *turmeric*:—*Ash*, mixed black and red, decidedly ferruginous, amounting to 36.56 per cent., and consisting chiefly of *chalk*, and *some iron earthy substance.*

16*th Sample.*—Portion of small cake, hard, dry, heavy, and of an orange brown colour, contains *sago starch*, altered by heat:—*Ash*, amounting to no less than 58.46 per cent., and consisting principally of *chalk.*

17*th Sample.*—Portion of small cake, soft and paste-like, deliquescent and gritty, faded, and evidently spoiled; contains a considerable quantity of *turmeric:—Ash*, mixed black and red, but green at bottom, amounting to 40.30 per cent., and consisting of *chalk*, *alkali*, a little *salt*, and *some iron earth.*

18*th Sample.*—Portion of small cake, dry, hard, and ponderous:—*Ash* amounting to no less than 62 per cent., or considerably more than one-half the article, and consisting chiefly of *chalk* and *sulphate of lime*, with traces of *lead.*

19*th Sample.*—Bright red, soft, gritty, salt to the taste and deliquescent; contains an enormous quantity of *rye flour; ash* ferruginous, and amounting to 33.32 per cent., consisting chiefly of *salt and some earthy colouring matter.*

20*th Sample.*—Brilliant red, very soft and gritty; salt to the taste, contains an enormous quantity of *rye flour; ash* mixed black and red, amounting to 15.24 per cent., and consisting of *salt* and a *ferruginous coloured earth.*

21*st Sample.*—Bright red, soft, salt to the taste and very deliquescent; con-

tains a very large quantity of *wheat flour; ash* red, amounting to 11.20 per cent., and consisting of *salt* and a *red earth.*

22*nd Sample.*—Bright red, soft, salt to the taste and deliquescent, containing much starchy matter; *ash* pink, and amounting to 13.86 per cent., consisting of *salt*, with 1.20 per cent. of *lead*, and traces of *iron.*

23*rd Sample.*—Bright red, very sott and moist, salt and very deliquescent, contains a very large quantity of *rye flour; ash* black and grey, amounting to 16.06 per cent., and consisting principally of *salt.*

24*th Sample.*—Bright red, sott, salt, and very deliquescent; contains a very large quantity of *rye flour; ash* mixed black and red, amounting to 18.06 per cent., and consisting of much *salt*, with some *red ferruginous earth.*

25*th Sample.*—Deep red, rather salt and deliquescent; *ash* grey, amounting to 11.20 per cent., consisting in part of a little *salt*, and contaminated with *copper.*

26*th Sample.*—Deep red, salt, deliquescent, ash ferruginous but green at bottom, amounting to 10.36 per cent., and consisting of *salt*, *alkali*, and rather much *iron.*

27*th Sample.*—Much faded and evidently spoiled, dry, hard, and heavy, much worm-eaten, the maggots or larvæ being alive; *ash* bright red like *Venetian red* itself, amounting to 14.20 per cent., and consisting chiefly of *salt*, *Venetian red*, and *lead.* The *iron* and *alumina* amounted in this case to 4.20 per cent., and the *lead* to .50 of a grain.

28*th Sample.*—Deep red with specks of white here and there, hard and firm, salt, and somewhat deliquescent, contains a good many granules of *sago* starch, *ash* red, amounting to 21 per cent., and consisting of *chalk*, a little *salt*, and a *red earth.*

29*th Sample.*—Black on the outside but red within, rather soft, salt and deliquescent; *ash* ferruginous, amounting to 13.32 per cent., and consisting of *salt* with 5 per cent. of *alumina* and *iron.* This sample was also contaminated with *copper.*

30*th Sample.*—Bright red, very soft and deliquescent, contains an immense quantity of *rye flour; ash* mixed black and red, amounting to 16.20 per cent., and consisting principally of *salt* and *some red earth.*

31*st Sample.*—Bright red, soft and moist, very salt and highly deliquescent; contains an immense quantity of *rye flour; ash* mixed black and red, amounting to 15.38 per cent., and consisting of much *salt* and *some iron earth.*

32*nd Sample.*—Bright red, soft, moist, very salt and deliquescent; *ash* mixed red and black, amounting to 19.26 per cent., and consisting of much *red ferruginous earth and salt.*

33*rd Sample.*—Deep red, soft, and paste-like; salt, very deliquescent, and contains a very large quantity of *rye flour; ash* ferruginous, amounting to 16.66 per cent., and consisting of some *red iron earth* and *salt.*

34*th Sample.*—Bright red, soft, paste-like, salt to the taste, and very deliquescent; contains an immense quantity of *rye flour; ash* mixed red and black, weighing 15.70 grains per cent., and containing rather much *iron* and *salt.*

From a close examination of these analyses, the following conclusions may be deduced:—

1st. That of the thirty-four samples of Annatto of all kinds examined, *two only were genuine*, and were entirely free from adulteration; these being two red cake annattos as imported.

2nd. That the whole of the remaining samples consisted of *mixtures in various proportions of one or more substances, these amounting in many cases to one-half, and in some instances to even two-thirds of the entire specimens.*

3rd. That of the two samples of *Black Annatto*, obtained from manufacturers, one furnished a highly ferruginous *ash*, which was very alkaline, which amounted to 32.50 per cent., and which consisted of an *alkali*, some *chalk*, and *a red*

ferruginous earth; while the second yielded an *ash* that weighed 35.36 per cent., which was still more ferruginous, and which consisted of *alkali* and *some red earth.*

4th. That of the four samples of *Orange Cake Annatto*, obtained from manufacturers, one furnished an *ash* which amounted to 62.00 per cent., and which consisted chiefly of *chalk*, with a trace of *lead;* the *ash* of the second sample weighed 57.72 grains per cent., and also consisted principally of *chalk;* the third sample contained a large quantity of *turmeric* and a little *wheat flour;* the *ash* amounted to 44.4 per cent., and consisted of *chalk* and some *red earth;* while the *ash* of the fourth sample weighed 63.00 per cent., and was composed chiefly of *chalk.*

5th. That of the two samples of *Red Cake Annatto*, procured from manufacturers, one contained a very large quantity of *wheat flour*, and yielded 17.12 per cent. of *ash*, which consisted of *salt* and some *red earth;* the other also contained a very large quantity of *wheat flour*, and furnished 14.26 per cent. of ash, consisting chiefly of *salt* and some *ferruginous earthy colouring matter.*

6th. That of the five samples of *Orange Cake Annatto*, purchased of different retail dealers, one yielded 57.80 per cent. of *ash*, which consisted principally of *chalk;* a second contained a very large quantity of *turmeric*, and gave an *ash* which weighed 36.56 per cent., and which was composed of *chalk* and a *red ferruginous earth;* the third contained the starch of *sago*, the *ash* weighing 58.46 per cent., which was composed chiefly of *chalk;* the fourth contained a very large quantity of *turmeric*, and yielded 40.30 per cent. of *ash*, composed of *chalk*, *ferruginous earth*, and a little *salt;* while the fifth gave 59.12 per cent. of *ash*, which consisted principally of *chalk* with traces of *lead.*

7th. That the samples of *Red Roll Annatto* nearly all contained large quantities of either *wheat*, *barley*, or *rye flour*—usually the latter, to the extent of 30 and even over 40 per cent.; much *salt* and some *red ferruginous earth*, as *Venetian red*, *red ochre*, or *reddle.**

Reviewing then the results of the microscopical and chemical examination of the thirty-four samples of annatto, it appears that large quantities of *turmeric* were present in three samples, *wheat* or *barley* flour in four, and *rye flour* in nine; the majority of these samples containing full forty per cent. of flour; that *chalk* was present in a great many cases, frequently to the extent of fifty and even over sixty per cent., *sulphate of lime* in at least five cases, a *red ferruginous earth* in a great many, an *alkali* in several, *salt* in many, *lead* in five cases, and *copper* in at least four samples.†

The *iron* and *alumina* amounted in some cases from near three to over five per cent. Had all the samples been examined qualitatively for iron, it is probable that still larger amounts would have been met with, as the worst cases were not specially selected for examination.

In two of the five samples in which *lead* was detected, the quantity was not weighed, and is described as *traces* only, while in the other three samples the quantities amounted to .30, .50, and to 1.20 per cent.

The copper was present probably as an impurity or contamination.

Desiring not to leave the smallest room for doubt as to the accuracy of the results I have placed before the Society, I asked Mr. Hogg, the author of *The Treatise on the Microscope*, to examine with me some of my samples of annatto microscopically; this he was good enough to do, and he is fully prepared to testify to the correctness of my results so far as the microscopical examination is concerned. I also forwarded to Mr. Hogg nine samples of annatto, requesting him to examine four of them microscopically, and to send the remaining

* "The lighter tint of Venetian Red is produced by adulteration. Our informant, a manufacturer, told us that Venetian Red was adulterated to suit the various prices of the market."—*Dr. Pereira.*

† One of the two specimens of annatto purchased by Mr. Hogg also contained *turmeric* in large quantity, as also *copper.* On further examination, I find copper to be present in the greater number of the roll annattos.

five samples to some Chemist for analysis, taking care not to mention my name in any way. The results of this proceeding are as follows. Mr. Hogg reports :—

"The specimens of annatto I have submitted to a careful microscopical examination, and I find *all adulterated.*

"No. 6. Is largely adulterated with the starch of a cereal, *rye starch*, I believe, and a small quantity of *mineral colouring matter*, which a drop of hydrochloric acid changed from yellow to brown. The starch granules, after becoming swollen, burst.

"No. 7. Contained *cereal starch grains*, starch grains of very small size, those of the annatto seed, and masses of *mineral colouring matter*, which hydrochloric acid dissolved with a brisk effervescence; this crystallized again in needle-shaped crystals as the fluid evaporated.

"No. 8. Largely adulterated with *barley starch*, I believe, as a few hairs or sperms could be seen, and the starch under polarized light gave a faint cross. A drop of hydrochloric acid changed nearly all the colouring matter to a dirty brown, the starch grains became swollen, and many burst.

"No. 9. Contains a large quantity of the starch grains and cells of *turmeric powder*, which a drop of hydrochloric acid renders transparent or colourless, and the rest of the colouring matter dissolved *with a brisk effervescence.*

"The adulteration of annatto with starch appears to be generally practised, that is, if one may judge from these specimens, and many others I have had the opportunity of examining at your house, and at my own. I lately purchased some in this neighbourhood, two of which I send you marked ten and eleven.

"No. 10. You will readily see without the microscope is very bad, much adulterated, or rather made up with *ferruginous earth* ground in oil, some *turmeric powder*, and a little *starch.*

"No. 11. Is fully two-thirds starch, from a cereal, *barley*, with vegetable fibre, some showing the dotted fibre, and crystals of *chloride of sodium.*"

One of these samples yielded 24 per cent. of ash, the other 19.30 per cent.; both contained much *salt*, and one rather much *copper*, as a decided blue solution was produced on the addition of ammonia.

Lastly, the following are the results of Dr. Bernay's analyses of the samples forwarded him by Mr. Hogg.

No. 1.

Ash of 100 grains, weighed 62.40, which was composed of—

Carbonate of lime	37.88
Sulphate of lime	8.82
Alkaline sulphates	4.34
Chloride of sodium	6.42
Iron and alumina	2.14
Lead, traces, sand, &c.	2.80
	62.40

No. 2.

Ash of 100 grains, weighed 13.70 :—

Chloride of sodium	6.87
Sulphate of lime	4.12
Iron and alumina	1.40
Sand, &c.	1.31
	13.70

No. 3.

Ash of 100 grains, weighed 17.20 :—

Chloride of sodium	9.30
Sulphate of lime	4.00
Iron and alumina	.90
Sand, &c.	3.00
	17.20

No. 4.

Ash of 100 grains, weighed 13.95 :—

Chloride of sodium	4.31
Sulphate of lime	5.92
Iron and alumina	1.32
Sand, &c.	2.40
	13.95

No. 5.

Ash of 100 grains, weighed 62.26:—

Carbonate of lime	42.00
Sulphate of lime	8.84
Chloride of sodium	6.56
Iron and alumina	3.20
Sand, &c.	1.66
	62.26

I wish here to correct an error into which Mr. Redwood has fallen, in referring

to my evidences on the subject of the adulteration of annatto. In the Report of Mr. Redwood's observations contained in the *Pharmaceutical Journal* for November, the following passage occurs :—" It was stated by Dr. Hassall, in his evidence before the Committee of the House of Commons, that he had found annatto to be adulterated with chalk, flour, turmeric, salt, an oily substance, probably soap, a red ferruginous earth, probably Venetian red, copper, and lastly red lead." Now, I simply said that the samples of annatto which I had examined contained the above-mentioned substances, and not that they were adulterated with them ; this distinction is important, because I never intended it to be understood that copper, or the soapy substance (alkali), were adulterations, although the other articles enumerated I consider to be such.* So far as I am aware, the addition of copper to annatto would serve no useful purpose.

In the statement that annatto sometimes contains red earth and lead, there is nothing very remarkable, and certainly nothing new, since the statement has been made by more than one observer long since.

Accum, at page 276 of his *Treatise,* writes thus :—" Several instances have come under my knowledge in which Gloucester cheese has been contaminated with red lead, and has produced serious consequences on being taken into the stomach. In one poisonous sample which it fell to my lot to examine, the evil had been caused by the sophistication of the annatto employed for colouring cheese. This substance was found to contain a portion of red lead." Accum then goes on to quote the particulars of a case recorded by a Mr. Wright, of Cambridge :—A gentleman, after partaking of some toasted cheese at an inn on two different occasions, was both times made ill by it. The matter was referred to the manufacturer of the cheese, who, on inquiry, ascertained that the annatto which had been used to colour the cheese was itself coloured or adulterated with both vermilion and red lead.

Again, Mr. Mitchell, in his *Treatise on the Falsification of Food,* published in 1848, states, page 231—" I have frequently examined specimens of annatto which have been contaminated with red lead, or a mixture of red lead or ochre, I have only met with cheese that contained lead on one occasion, although it may be comparatively common."

Lastly, Dr. Normandy, in his *Commercial Handbook of Chemical Analysis,* writes, " Unfortunately as it, annatto, is very often adulterated with red lead, or with both red lead and ochre, the use of such annatto is very injurious, and serious accidents have been caused thereby."

Two of the authors quoted, viz., Accum and Mitchell, testify to the fact of the presence of lead in annatto and cheese of their own knowledge. It is not clear whether Dr. Normandy does so or not, or whether he merely repeats the statements of others on the subject. Now there is no evading the evidence of the first two witnesses, unless we consider that they have been guilty of wilful misrepresentation, which I apprehend we have no right to assume.

I would now observe, that in some of the samples the ingredients were so badly mixed, that in some instances we may pick out specks or masses of the substances added, as of the different kinds of flour used, turmeric, chalk, and red earth.

Now the manufacturers of annatto will doubtless try to persuade us, and perhaps others who are not manufacturers will do so as well, that some of the substances which I have mentioned to-night are introduced to improve the article, to render it more soluble, and to make it keep better. I am ready to admit that the use of alkali is perfectly justifiable to render it more soluble, but beyond this I do not go, and allowing this plea of improvement to have all the weight that can possibly belong to it, enough will still remain to show that annatto is subject to a large amount of adulteration, for it is impossible to justify the use of turmeric, of Venetian red, or reddle, of 40 or 50 per cent. of wheat,

* It now appears that the copper detected must also be regarded as an adulteration.

barley, or rye flour, and of 50 and over 60 per cent. of chalk and sulphate of lime.

With respect to the plea which may possibly be urged, that some of the substances added make it keep better, I would remark, that annatto, with ordinary care, will keep perfectly well without any such addition, and that the substances added are not always effectual. Thus, while I have never seen a sample of annatto as imported attacked with maggots, several of those which I have purchased at shops were so, and in consequence of the large quantity of salt which they contained, they attracted water to such an extent, that they quickly became spoiled. One specimen which was riddled through with holes, yielded an ash which weighed 12 per cent., and it contained lead and iron. Another sample, one of those sent by Mr. Hogg, was infested with living larvæ, and yet this contained a large quantity of turmeric powder, starch, salt, and a red earth—the ash amounting to 24 per cent., and yielding 1.70 per cent. of iron and alumina, as red as reddle.

Some of the samples examined did not contain more than 30 per cent. of annatto, and could it be shown that the reduction of annatto to this enormous extent was justifiable—which, however, it certainly is not—then it cannot be denied it is high time that the name of annatto should be abandoned, and that some name or names should be adopted which would express the actual composition of the article, and serve to indicate the fact that the article thus reduced consists in part only, and that often the smallest part, of that which it professes to be—viz., annatto.

I now come to make a few remarks on the employment of annatto in the colouring of milk, butter, but principally cheese. I would first state that I do not apprehend that danger, I will not say ever, but is often likely to arise from the occasional presence of lead in annatto, seeing that the quantity of annatto used to colour cheese is but small. There is a practice sometimes followed in the case of certain descriptions of cheese, which I consider to be more dangerous, viz., that of giving cheese a thick coating of Venetian red, or reddle; should these contain lead, now it might happen that the quantity consumed would be sufficient to be productive of disagreeable consequences.

The practice of colouring cheese with annatto entails, however, some expense and trouble, while it serves no really useful purpose, and on these grounds it is to be condemned; but on this point I will cite the opinions of two well-known authorities on dairy farming.

In the *Rural Cyclopædia*, part i, p. 197, we find amongst other remarks relating to annatto, the following:—"Another variety of annatto that is commonly employed in English dairies, is manufactured in Brazil into small rolls, each two or three ounces in weight, hard, dry, and compact; brownish without, and red within. But its grand interest to the farmer consists in its very extensive use as a colouring matter for butter, and especially cheese. The cheese-makers of Gloucestershire give one ounce of annatto to one hundred-weight of cheese, and those of Cheshire eight dwts. to sixty pounds. But as these quantities are far too small to medicate the cheese, or even to affect its flavour, the only advantage to be derived from the annatto is mere colour, and surely the appearance of Stilton or Dunlop cheese upon the table is to the full as agreeable as that of Gloucestershire or Cheshire cheese. The use of annatto, therefore, is sheerly whimsical, imposing perfectly useless trouble on the manufacturer, and some small ridiculous expense upon the purchaser. The mode of using it is to dissolve it in the hot milk immediately before earning."

Mr. Stephens, in his *Book of the Farm*, part iii., p. 288, makes some observations on the use of annatto to colour cheese, nearly to the same effect. He says:—"I have not recommended the use of annotto, or arnotto, for dying cheese, because I think by it the cheese-farmers impose upon themselves—a very useless piece of trouble. All the quantity employed is said to impart no peculiar flavour to the cheese; which being acknowledged, of what utility is it? As for

improving the appearance of cheese, I suppose it will not be denied that Stilton and Dunlop cheese look as well upon the table as Gloucester and Cheshire cheese."

I have now adduced ample evidence to prove that I do not advance statements, with regard to the adulteration of any article, without first having recourse to all those scientific measures and investigations, both microscopical and chemical, which are necessary in order to arrive at correct and trustworthy results.

Dr. Hassall, having concluded his paper, said he wished, before resuming his seat, to make a few remarks upon the proceedings of the previous meeting, and the report of those proceedings which appeared in the *Pharmaceutical Journal*. Mr. Redwood had taken objection to the title of Analytical Sanitary Commission, under which his investigations on the subject of adulteration had been published, but he (Dr. Hassall) was not responsible for that title. He might state, however, that the term Commission was not unfrequently used under similar circumstances. The *Times* newspaper had its commissions and commissioners. He thought the really important question was, not under what title were the results published, but were they correct? Nothing had been adduced to invalidate their accuracy. Exception had been taken to his (Dr. Hassall's) qualifications as a Chemist; but it must be borne in mind that three-fourths of the results were obtained by the use of the microscope, and his competency for this part of the investigation had never been questioned. The remaining fourth of the results were chemical, but the chemistry involved in them was of a very elementary nature, and it must be recollected that in this department he had been assisted by Dr. Letheby, who had performed all the difficult analyses. This fact had been stated by Mr. Clark at the previous meeting, but it was omitted in the report of the meeting which appeared in the *Pharmaceutical Journal*, and he was anxious that that omission should be corrected in the next number of the *Journal*.

Mr. Redwood said he felt that Dr. Hassall might be complimented on the manner in which he had introduced the subject of his paper, as there was evidence of his having taken considerable pains to collect his facts; and he (Mr. R.) was quite ready to give him credit for having had but one object in view, namely, to attain the truth in the investigation he had undertaken. He thought Dr. Hassall had done well in bringing his paper to that meeting, and in submitting his results and conclusions to the criticism of a company of well-informed practical men. It was much to be regretted that he had not adopted a similar course on previous occasions before committing himself to publication. Had he done so, his judgment would have been, in many instances, corrected, and the effects of his erroneous statements would have been at the same time counteracted.

With reference to the paper which had just been read, he (Mr. R.) fully concurred with an observation made in an early part of the communication, to the effect, that in order to arrive at a just conclusion on such a subject, it was necessary to be well acquainted with the properties of the substance referred to, in its original condition. He had expected, after hearing this statement, that Dr. Hassall would have shown that he possessed an intimate acquaintance with the properties of annatto in the state in which it is imported into this country; but in this respect he was entirely disappointed. Instead of taking his little modicum of information from Dr. Ure's Dictionary, he should have gone to the substance itself, have obtained authentic specimens of genuine annatto as imported, and have carefully examined and studied the properties of this substance. Had he done so, and had he, further, consulted men practically acquainted with the subject, he would probably have come to a very different conclusion from that which was expressed in his paper. But Dr. Hassall was evidently ignorant of the condition and properties of annatto in the state in which it is imported,—he had neglected to act upon the very principle that he had laid down for himself,

and this was the rock upon which his whole case was shipwrecked. He (Mr. R.) thought it would not be difficult to satisfy Dr. Hassall, or any one then present who might not be practically acquainted with the subject, that annatto, in the state in which it is imported, is unsuited for most of the uses to which it is applied, and wholly unfit for retail commerce. There were two varieties of annatto imported, but of each of these there were many varieties of quality. This annatto, before it passed into retail commerce, was submitted to certain processes which had for their objects the prevention of speedy decomposition, and the development of properties not possessed by the annatto in its original state, and which were required to render it suitable for the purposes to which it was applied. The annatto of retail commerce was not in the state in which it was imported,—it was the result of a manufacture adopted in this country. Dr. Hassall, in his paper, had alluded to the manufacture of annatto in this country; but he was evidently wholly ignorant of this part of his subject, and hence he had stigmatized as adulterations those necessary operations to which the annatto is subjected by English manufacturers. He (Mr. R.) had specimens before him of annatto in the state in which it comes to this country. He placed on the table more than a hundred such samples which had been taken within the last six weeks from original packages before they had passed into the hands of the merchants. This was genuine annatto, if by that term was understood the product in the state in which it was obtained by the natives of Cayenne and Brazil. But what would be the effect of sending the annatto in that state into commerce? In the course of a few weeks the greater part of it would be either a moving mass of maggots, or covered with mould. Of all the specimens he laid before the meeting, which had been fairly taken, without selection, from original packages, there was not one in which this change had not already taken place to a considerable extent. All the imported annatto was subject to this change, although not all equally so. There was a great difference in the state in which the annatto was imported. Sometimes it was almost as soft as treacle, while other samples had the consistency of a stiff extract. There might occasionally be a sample as imported that would keep for a few months without anything being done to it to promote its preservation; but such was not usually the case. Wholesale dealers had sometimes sent it out as imported, in which case it was frequently returned upon their hands again in a worthless condition. Some of the wholesale dealers prepared it themselves for retail commerce, adopting such means as their experience, and the purpose for which it was intended, indicated as most suitable. But there was a class of men whose business consisted in manufacturing annatto. These were the English manufacturers who had a twofold object to fulfil—the prevention of speedy decomposition, and the development of such properties as would render the annatto applicable for the purposes for which it was intended. For some purposes the colouring matter of the annatto was available in the state in which it was imported, and all that was required was to make it permanent; but for other purposes new properties had to be imparted to the annatto, and this was especially the case in preparing it for use as cheese colouring. Now, he (Mr. R.) considered the manufacture of annatto, as conducted in this country, to be a perfectly legitimate business. There were only a few persons engaged in it, but these were men of high respectability, who were engaged in a useful occupation. They took the annatto as imported, which was a remarkably perishable article, and they rendered this unchangeable, and at the same time imparted to it new properties, which made it more valuable. This could not be done without adding something to the annatto; but was this addition to be called adulteration? Dr. Hassall condemned such additions as adulterations.

Dr. Hassall begged to say that, in his evidence before the Parliamentary Committee, he did not describe the substances he had found in annatto as adulterations; he had abstained from the use of that term in reference to annatto; and only spoke of what he found to have been added to the annatto.

He was aware that something was required to be added, and in his paper he admitted that the addition of an alkali was beneficial.

Mr. Redwood thought it was much to be regretted that Dr. Hassall had not given this explanation before the Committee. Certainly the effect of his evidence had been to convey the idea, that he considered the substances he had named as adulterations.* Even now it was difficult to know what his opinion was on the subject He considered that the addition of an alkali might be beneficial. But what was the value of Dr. Hassall's opinion upon such a subject? Here was a man without any experience or practical knowledge in reference to the substance under consideration, setting up his judgment in opposition to that of manufacturers, who had been all their lives engaged in the preparation of this dyeing material, and who had gained credit and reputation for having successfully imparted to the annatto the properties that were most required. It was admitted then that something must be added to the annatto, and if so, what less objectionable substance could be used than starch or flour? To absorb moisture and give consistency, this answered very well; and if these were the only objects to be attained, they were thus easily effected. But although this was sometimes sufficient, yet there were purposes for which the annatto was used, which rendered it necessary that some other additions should be made to it. When used for cheese colouring, an alkali was added, to render the colouring matter soluble in an aqueous liquor. Caustic potash or soda would do; but if these were added alone, the annatto, already too moist, would become still more so. Carbonate of potash and lime answered the purpose better, and hence the carbonate of lime which Dr. Hassall so frequently found in commercial annatto. Now he (Mr. R.) was prepared to justify these additions. They were made for a legitimate object, and they fulfilled that object in an unobjectionable way.

Dr. Hassall said he did not consider a little starch, or a little carbonate of lime, to be an adulteration, but he had found more than a little.

Mr. Redwood continued. The quantity of substance required to be added, as well as the nature of it, depended partly upon the particular state and quality of the annatto operated upon, which was very variable. This was a question best determined by the manufacturer, whose interest it was not to deteriorate, but to improve the quality of his product, upon which his reputation and success in business depended. No doubt there was a difference in the degree to which this object was attained by different manufacturers. One manufacturer might excel another in practical knowledge, judgment, and skill. Each manufacturer had his particular processes for preparing the different sorts of annatto, which would account for the different ingredients found in the samples examined.

But what did the result of Dr. Hassall's examination of annatto amount to? Why, simply to this:—That there were found to be several different sorts of annatto in commerce, most of which were the results of manufacturing processes, adopted in this country with the view of adapting the substance for the different purposes for which it was intended to be used: and that these different

---

* Extract from minutes of evidence:—

114. *Dr. Hassall.*—I will now proceed to *annatto*. I may mention that annatto is a vegetable colouring matter; it is used largely in dyeing, and also in colouring cheese and butter and cream.

115. *Mr. Villiers.*]—Is it imported?—Yes, and it is a very expensive substance. From a review of the results of the microscopical and chemical examinations of thirty-one samples of annatto, it appears that chalk was present in twenty-one samples, wheat flour in four, rye flour in nine, turmeric in three, salt in nineteen, an oily substance (probably soap) in several, a red ferruginous earth (probably Venetian red) in nineteen, copper in three, whilst red lead was detected in five of the samples.

116. *Viscount Ebrington.*]—Do you believe the adulteration of annatto to be chiefly made abroad or in this country?—I think the greater part of the adulterations practised with annatto take place in this country; indeed, I am satisfied that that is the case.

products contained different ingredients, which more or less completely fulfilled the objects for which they were introduced. And what had all this to do with the subject of adulteration? It was true Dr. Hassall stated that he found substances in some of the samples of annatto which might prove injurious to health. He stated that he had found lead and copper. The presence of lead and copper in a substance used for colouring articles of food was certainly a fit subject for serious consideration and inquiry. Looking at Dr. Hassall's evidence, it would be thought that this was the most serious part of the statement in reference to annatto. He stated that "copper was present in three, whilst red lead was detected in five of the samples." This was a grave accusation, but what did it amount to when sifted? First, with regard to lead. In two out of the five cases the quantity of lead discovered was a mere trace; in two other cases it was described as less than one per cent.; and in only one case did it amount to as much as one per cent. This, no doubt, was considered to be an adulteration —something introduced with a fraudulent intention. He (Mr. R.) would be glad to know what object there could be in introducing a trace of lead or even one per cent. of lead. Dr. Hassall in his evidence represented it as red lead, but where was the evidence of this? It was obvious that lead, if present, could not have been introduced in such quantities with any object, and that its presence must have been purely accidental. But even if it were present, what injury was likely to result from it in such quantities in the applications for which it was intended? Was Dr. Hassall justified in alarming the public by an unqualified statement that copper was present in three samples, and lead in five samples, out of thirty-one samples of annatto, when the fact was that in nearly all these cases he had only discovered traces of the metals, and that in no case was there such a quantity as to cause injury to health, or to justify the opinion that it had been introduced intentionally? He (Mr. R.) was not prepared to say that small quantities of lead may not have been present in the samples of annatto referred to, but he knew of no motive there could be for putting it in, and therefore he required further information, and better authority for the fact, than had yet been adduced. The statement, as made by Dr. Hassall, was a grave imputation upon the characters of the manufacturers or dealers, and as he understood from Dr. Hassall that he no longer put himself forward as an analytical chemist, such a charge ought not to have been made upon the mere evidence of his analyses. Then, with regard to copper, Dr. Hassall admitted that this could only be there accidentally. If so, why alarm the public by stating that copper was present, without explaining that there was only a trace of it, and that this was probably an accidental impregnation from the vessels in which the annatto was prepared? He (Mr. R.) was disposed to think, however, that there was better ground for assuming that copper had been intentionally introduced, than there was with regard to lead. He could conceive an object for introducing a small quantity of copper. Among the communications he had received from different parts of the country on the subject of annatto, was one from a chemist in Somersetshire, who states that a minute quantity of sulphate of copper had been found efficacious for preventing a defect which sometimes occurred in the cheese of that district, and he suggested that a salt of copper might have been introduced into the samples of annatto referred to with that object. This certainly was a subject worthy of careful investigation. The question was a debatable one, whether any quantity of sulphate of copper ought to be introduced into articles of food. In France, and other continental countries, in spite of the stringent laws which had been passed upon the subject, sulphate of copper was to the present day used, as our bakers used alum, in making bread. An extremely minute quantity produced the required effect. He did not mean to justify the use of such a substance, but the subject was one demanding a thorough investigation. He considered this a very fit subject for discussion at such meetings as the present, and if Dr. Hassall had brought other subjects, on which he had given evidence, in the same way for discussion there, they would have been fairly and impar-

tially considered, and such consideration, he had reason to believe, would have conduced to the elucidation of the truth.

Dr. Edwards, of Liverpool, wished to ask a question of Dr. Hassall, with reference to some of the analyses, the results of which were given in his paper. Among the substances stated to have been found in annatto, there was one that he did not recollect to have seen described in any scientific work. Among the numerous microscopic drawings which had been published, he had never seen a description of it, nor was he aware of any chemical test for it. The substance he referred to was that which in the report of the analyses was called "rubbish."*

Dr. Hassall said the word had not been used by him; it occurred in the analysis of Dr. Bernays.

Dr. Bernays said he had received from Mr. Hogg some samples of annatto for analysis, and in noting down the results, he had included all that was insoluble in hydrochloric acid under the term rubbish. This term was certainly contained in the rough notes which had been given to Mr. Hogg, but he had no idea that those notes were about to be made public. He considered the quantity of chalk present in some of the samples unnecessarily large.

Mr. Redwood inquired on what ground he formed that opinion, and whether he had had any practical experience in reference to annatto?

Dr. Bernays said he had had no practical experience in annatto, but as he found that some samples contained much smaller quantities of chalk than others, he concluded that the larger quantities were unnecessary.

Mr. Whipple thought that Dr. Hassall had not drawn a sufficient distinction between annatto as imported and the annatto which was manufactured in this country. He had expected from the title of the paper that the former of these would alone have been referred to; but it appeared that Dr. Hassall knew very little about that substance. Every practical man knew that annatto could not be sold in the state in which it was imported. Something had to be done to it. Sometimes it was made into rolls, and covered with oil to preserve it; but generally other substances were mixed with it. Not unfrequently the packages in which it was imported, on being opened, were found to be half empty, the annatto having been destroyed by maggots. When additions were made to the annatto it was with a view to its preservation. He spoke now of annatto, the colouring matter of which was unaltered. The cake annatto, which every one knew to be an article completely manufactured in this country, was quite a different thing. Lime, carbonate of potash, barley meal, and other substances, were used in the manufacture of cake annatto, and the cakes usually had the names of the makers on them. They were sold under the makers' names, and some of these makers had high reputations. There were different sorts, such as orange annatto, brown annatto, and so forth, the ingredients for making which of course differed. Dr. Hassall had drawn no distinction between these, but including them all under the name of annatto, was astonished to find in them ingredients differing in nature and in quantity. Why, of course there were such differences, which the distinctive names under which the annatto was sold sufficiently indicated. He thought it a pity that a man so little acquainted with the practical bearings of the cases referred to should have undertaken to influence the public in their selection of tradesmen, as had been done by the so-called Analytical Sanitary Commission.

Dr. Hassall said it was wrong to assume that he was the only one concerned in the Analytical Sanitary Commission.

Mr. Whipple thought that plea not sufficient to exonerate Dr. Hassall from responsibility for what had been done. A similar effect had been produced by his evidence before the Parliamentary Committee.

Dr. Hassall remarked that he was not the only one who had given evidence.

* The term rubbish was expunged by Dr. Hassall from the proof of his paper.—Ed.

Mr. Whipple was quite aware of that, and he could say that of some of the evidence given he was proud, but he certainly could not say this of Dr. Hassall's evidence.

The Chairman said he had understood Dr. Hassall on more than one occasion to say that his evidence before the Parliamentary Committee had been misunderstood, and especially that it had been incorrectly reported in the *Times*. As the effect of that evidence as reported had been to prejudice the interests of a large body of men, the Chemists and Druggists of this country, he thought the least that Dr. Hassall could do would be publicly to correct the erroneous impression which had been produced.

Mr. Jacob Bell thought it was too late for Dr. Hassall to publish any correction of his former evidence. This should have been done at the time if at all. The inquiry had been taken up by others, and the real value of Dr. Hassall's testimony was becoming more generally known. The publication of this result would be more effectual than any contradiction by himself. Some light had been thrown on the subject by what they had heard that evening—as it appeared that annatto which had figured so prominently in Dr. Hassall's parliamentary evidence might be almost (according to his present views) struck off the list of adulterated articles.

(*No, no*, from Dr. Hassall.)

At all events, among the substances enumerated as having been found mixed with it, one after another had been admitted by Dr. Hassall to be a necessary or conventional addition, until the amount of adulteration, properly so called, had dwindled down to almost nothing. It must be a matter of surprise, after the explanation which had taken place, that the subject should have been introduced at all before the Committee of the House of Commons, the object of that Committee having been merely to take evidence on adulteration. Again, Dr. Hassall had at their last meeting given notice of the paper which had just been read "On the Adulteration of Annatto;" but the chief part of the paper related to certain admixtures which he now withdrew from his list of adulterations. Why then, were they enumerated, and what was the object of the paper? One object he had stated in his concluding remarks, namely, that of showing his usual mode of research and investigation as a guarantee of the accuracy of his reports. If this were to be taken as a specimen, of what value was the remainder of his evidence? This, which had been one of the most flagrant cases of adulteration, having broken down, what inference would the public be likely to draw in regard to other charges? The obvious tendency of such disquisitions as that which had taken place on annatto, was to divert the public attention from really important frauds and adulterations, and thus retard the progress of the reform which all honest men must desire. It should also be remembered that upwards of 2000 persons had been publicly accused, and personally held up to reprobation. Taking the evidence adduced in the case of annatto as a specimen, there was considerable ground for doubt as to the justice of many of these charges. The persons so attacked, whether innocent or guilty, were equally at the mercy of their accusers. It would be impossible, after the lapse of a month or six weeks, to prove a negative. The defendant might challenge an examination of all his stock; but that would be no answer to the allegation that on a certain day a certain impure article was purchased at his house. He might, although innocent, be disgraced, or almost ruined for want of evidence, which, from the nature of the charge, was unattainable. Justice, therefore, demanded that great caution and discrimination should be exercised in the publication of statements of that description; and exaggerated or random assertions were not only unjustifiable, but calculated to frustrate the professed object in view. He (Mr. Bell) had always been favourable to the parliamentary inquiry, and also to the Analytical Sanitary Commission, believing that such proceedings, if conducted honestly, fairly, and disinterestedly, would be productive of public good. But the self-imposed duties of the Commission were of that delicate nature, that even the

shadow of a suspicion as to the disinterestedness of the parties concerned would tend to invalidate the result; and considering the apparent influence of the published reports on the advertisements, as well as the circulation of the periodical, he had watched narrowly the progress of the movement. It was scarcely necessary to explain this influence, as it was easily understood. He had also on several occasions called in question the accuracy of what appeared to him to be exaggerated and garbled statements. For so doing, he, as well as Mr. Redwood, had been assailed as promoters of fraud and adulteration. The chemists (who had previously been attacked indiscriminately and without reservation) were now complimented in the *Lancet* as being a highly exemplary and respectable body, in contradistinction to Mr. Redwood and himself, who were held up to obloquy, and accused of endeavouring to prove that adulteration was honest.

(Dr. Hassall disclaimed any participation in the articles referred to, having at present no connexion with the *Lancet*.)

However that might be (Mr. Bell continued), he took a similar tack, and was making it a party question in the Society; both he and those with whom he was associated had been endeavouring to circulate an erroneous and unjust impression to the prejudice of those who refused to endorse the exaggerated statements. Such misrepresentations, however, were of little consequence, as the truth would ultimately prevail, and he (Mr. Bell) hoped the subject would occupy the attention of the Society until it had been thoroughly sifted.

Dr. Hassall called upon Mr. Bell to retract or explain his observation respecting the advertisements and reports in the *Lancet*. Unless he was prepared to state a case, he had no right to insinuate.

Mr. Bell neither made, nor wished to make any charge; but being called upon for a case, he would state one by way of explanation. A person called on a respectable tradesman for an advertisement for the *Lancet*, which was refused; shortly afterwards, by some remarkable coincidence, the individual was shown up in the *Lancet*, as having sold some preserves adulterated with copper.

Dr. Hassall—Then it must have been a coincidence, for I made all the purchases myself, and had no communication whatever with the advertising department. You have no right to make such insinuations without proof.

Mr. Bell—But there was another coincidence still more remarkable. Some little time afterwards a person called; he might have been an impostor, but at all events he represented himself as having come for advertisements for Dr. Hassall's book, then about to be published. This also was refused, the party observing that he had been ill-used—supposing Dr. Hassall and the *Lancet* to be connected—and he declined altogether to advertise. On which the person (whether impostor or not) replied to this effect: Let bygones be bygones; give us an advertisement, let us have some of your goods to examine, and you shall have a favourable notice.

Dr. Hassall declared this was the first time he had ever heard of such an allegation. He observed, however, that, as Mr. Bell knew very well, editors could not be held responsible for every casual remark of the parties employed to collect advertisements, and who might, possibly, in their anxiety to do business, make statements for which they had no authority or sanction. In reply to Mr. Redwood, he wished to state that, even admitting that some of the substances which had been found in annatto had been added without any fraudulent intention, nothing could justify the admixture of the large quantities of foreign matter which he had shown to be present in some samples. Mr. Redwood, while he justified the use of starch, chalk, and alkali, had said nothing about salt and turmeric, which were certainly adulterations. He (Dr. Hassall) thought that a little starch and a little chalk might be required. He did not say that any quantity of these substances constituted an adulteration, but he considered that an undue quantity was an adulteration.

Dr. O'Connor said, in reference to what Mr. Bell had stated on the subject of advertisements, that he could vouch for the fact that no communication existed between Dr. Hassall and the editor of the *Lancet* on such matters at the time referred to.

PHYTOLOGICAL CLUB.

17, *Bloomsbury Square, December 12th*, 1855.

DANIEL HANBURY, ESQ., IN THE CHAIR.

The following donations were announced:—

A collection of British Plants, from Mr. Tupholme.

A pamphlet on *The Geognostic Relations of the Flowering Plants and Ferns of Great Britain*, from the Publishers.

A piece of Rhubarb which it was supposed had been attacked by an insect, was sent for exhibition, by Mr. E. Wood, of Brighton.

Mr. Daniel Hanbury read some Notes on a day's Botanizing in the Mountains of the Vozges (France), in August last.

In this paper Mr. Hanbury described the ascent of the Holineck, the highest elevation but one of the Vozges, being 4484 feet above the level of the sea, and enumerated several of the most interesting plants gathered by him upon the mountain, specimens of some of them being laid before the meeting.

The next meeting will be held January 9th, 1855, which will be the Annual General Meeting for the election of officers.

PHARMACEUTICAL SOCIETY,

NORTH BRITISH BRANCH.

A meeting of the above Society was held in the rooms, 72, Princes Street, Edinburgh, on the evening of Wednesday, the 19th current, at nine o'clock precisely.

MR. JAMES GARDNER, PRESIDENT, IN THE CHAIR.

Specimens of Scammony were presented to the Society by J. F. Macfarlan and Co., and Mr. Young drew attention to that contained in two shells, which they had recently received with some scammony from Smyrna. He gave a brief account of the plant, the process adopted in collecting the sap, and the remarkable variations in quality which characterized much of that imported into this country.

Solutions were exhibited, showing the amazing amount of impurity contained in some that was sold as virgin. From the attacks of locusts the plant had suffered to a considerable extent during the last two years. Much difficulty had in consequence been experienced by the peasants in finding the roots — the labour was necessarily increased; and thus, though scammony could still be procured at the old prices, the quality was not so good. To have it fine, a higher price must be given, and there was no lack of fine in the market.

The shells agreed accurately in appearance with the description recently given in the Journal by Mr. D. Hanbury, and their exhibition to the meeting gave an increased interest to the statement.

The following communications were read:—

ON METHYLATED SPIRIT, AND SOME OF ITS PREPARATIONS.

BY J. F. MACFARLAN.

The difficulties under which the British chemists laboured in the use of alcohol, from the high price of that article occasioned by the heavy duty imposed on it, have long ago attracted the notice of the Government, and led them earnestly to desire some method by which relief might be afforded to the manufacturer, without at the same time affording increased facilities to the drunkard. Doubtless the Government was stimulated to more active exertion by the discovery that some branches of trade were in danger of being altogether driven out of the market of the world by the low

rate at which the foreign manufacturer obtained his spirit, compared with the high price paid by the British. So far as the home trade was concerned, all who worked with duty-paid spirit were on an equal footing; but so many scrupled not to defraud the revenue, that even at home fair competition could scarcely be maintained. The difference too between the rate of duty in different parts of the kingdom—a difference caused not by the manufacturer, but by the smuggler, rendered it very desirable that some method should be adopted by which the manufacturers of the three kingdoms might be placed on a footing of equality, and, thanks to Dr. Hoffman and Professors Graham and Redwood, that has now been accomplished. Their researches, the results of which have been embodied in a very able report to the Commissioners of Inland Revenue, have satisfactorily proved that the addition of wood naphtha or pyroxilic spirit to spirit of wine, in the proportion of one part of the former to nine of the latter, forms a liquid which may be given free of duty without incurring any risk of its being used for drinking purposes. And now this mixture, under the name of methylated spirit, is furnished to the trade under regulations framed by the Board of Inland Revenue. These regulations appear to have been framed in the most enlarged and liberal spirit. No unnecessary obstacle is thrown in the way, and nothing is required that the most fastidious may not comply with. It is quite true that they are somewhat stringent. It is necessary that they should be so. Were it otherwise, the revenue would be most deeply affected, and drunkenness, so much and so justly deplored, encouraged. The mixture of the wood naphtha with the spirit of wine may be made by any person who thinks proper to take out a licence for the purpose, and may be procured by any one who "shall undertake to use it for certain purposes in the arts and manufactures, subject to the approval of the commissioners," and may be procured in quantities so small as ten gallons, thus bringing it within the reach of every chemist, manufacturer, or employer of spirits in the arts. The authorities have thus done their part, and it behoves those for whose benefit the act has been passed to meet the commissioners in a similar spirit; and while using the methylated alcohol most freely in their manufactures, to avoid anything which may tend to make the mixture itself potable, and so defeat the generous intentions of the Government.

In the employment of methylated spirit the utmost latitude has been given to the chemist, the only limit being, as already alluded to, that its use is to be confined to the arts and manufactures; but as the applicant for participation in the benefits of the act must specify the object he has in view, an opportunity is afforded him of making his application as wide as he may consider needful, and having submitted it to the commissioners and obtained their approbation, he need be under no anxiety as to the freedom with which he may use it so long as he faithfully employs it for the purposes for which the liberty has been granted. A question, however, has arisen as to the employment of the "finish" in the manufacture of ethers, &c.; and with the view of arriving at a satisfactory conclusion on this point, I find, from the report of the proceedings of the Manchester Pharmaceutical Association contained in the last number of the Journal, that my friend Mr. Woolley, the president, addressed a letter to the chairman of the Inland Revenue Board, and in a note an extract is given from the reply of the honourable chairman, which simply says that the "Board must decidedly decline to sanction the recovery of the spirit from 'finish' by a person not authorised to make or receive methylated spirit." As the recovery of the spirit from "finish" would merely bring it back to the state in which it existed before the shellac was put into it, to have allowed this would have been to have given to the person recovering it all the advantages enjoyed by those regularly licensed, without the guarantee given in the application and grant, and secured by the bond, which would certainly have opened a wide door for applying the spirit to purposes not intended by the Board, and, therefore, I do not wonder at the reply; but the free unrestricted sale of the "finish" itself is a clear proof that the Board will not throw any unnecessary obstruction in the way of its legitimate use, and there cannot well be a more legitimate use of it than to employ it in the preparations of articles used *solely* in the arts and sciences.

It is a mistake, however, to suppose, that the chemists of Scotland generally employ "finish" in their preparations. If any one does so, it is not usual; the methylated spirit itself answers better than even a weak solution of shell or seed lac. The lac adds to the cost without improving the quality of the spirit. As to the employment of the methylated spirit in the manufacture of ether, chloroform, and the like,

there can be no question. These have been expressly permitted; indeed, they form one of the branches of manufacture on account of which the act itself was passed, and could these not be made from it, the Board at whose instance the act was passed would feel that one of the objects they had in view had not been accomplished, and that in so far their good intentions had been frustrated. We at least have been acting on this belief, and have prepared from it varnishes, French polish, finish, and ether solutions of lac, sulphuric ether, chloroform, &c., as formerly from spirit of wine, without let or hindrance, and intend applying it to the manufacture of everything in which we have hitherto employed alcohol in so far as it will answer the purpose; and a few remarks on some of the uses to which methylated spirit has been turned, may, perhaps, be acceptable to the Society. I would first notice shortly its employment in some trades in which spirit of wine was previously largely employed. In the manufacture of Hats, for example, many years ago, spirit of wine was introduced as a solvent for resins, or, as they are commonly called, gums, which being thus transferred to the substance of the hat, produced an article impervious to water, and the manufacture of the waterproof hats became a large and important branch of trade. By-and-by, however, the very high price of spirit of wine from the amount of duty, made these too expensive for the market of the world, and the British manufacturer could no longer contend with the foreign, who obtained his spirit of wine free from any such burden, and the trade in consequence declined. This, there is reason to believe, was one of the first causes which attracted the notice of Government, and if it did not originate, certainly quickened its effects for relieving the trade from this burden. Various other articles were attempted to be substituted as solvents of these resins, as aq. ammon., &c., but nothing could fully supply the place of the spirit of wine; and now that the "methylated spirit" is given freely, it is gratifying to find that it answers the purpose quite as well as the spirit of wine. Both the pure spirit and the finish have been employed in the preparation of the hats, and both have succeeded; and it may with some confidence be hoped that the foreign trade may revive, and the boon so frankly conferred by the Government be followed by a complete restoration of the prosperity of this important branch of trade.

But to Brassfounders the boon conferred has likewise been great. In the preparation of their lacquers they of necessity employed much spirit of wine; and here the high price of that article told heavily upon the trade, for the beautiful work they were able to put out of their hands by means of these liquids rendered their employment indispensable, while the high duty so enhanced their price as to increase the cost of manufacture greatly. In their case, too, the relief has been nearly complete, the resins being equally soluble in the "methylated spirit" as in the unmixed spirit of wine, the lacquers can be made as well with the one as with the other, and for the most part answer quite as well in their application. In some particular points they do not seem to answer, and pure spirit of wine has still to be employed; but these are few, and further experience may enable the manufacturer to make them fewer still, and thus enable him to realize the full benefit of the intentions of the Legislature.

To Cabinet-makers the boon has proved very important. Since the introduction of solutions of resins into this branch of trade the beauty thereby imparted to furniture in consequence of their skilful application, either in the way of friction, or by means of a brush, has given to all such furniture a decided preference in the market. But here, too, the high duty on spirit of wine stood in the way; for by enhancing the cost it either prevented their employment altogether, or made it so expensive as greatly to add to the cost of the furniture, and thus to limit the demand, by placing it beyond the reach of the less affluent classes of society. No other liquid having been found adequately to supply the place of the spirit of wine, even the wood naphtha employed in some places of the country having failed, partly from its price and partly from its vapour affecting the eyes of the workmen, nothing remained but a reduction of the duty, and in the methylated spirit that has been found; and as it contains only one part of the naphtha in ten, its injurious effects upon the eyes have not been much experienced. Thus the cost, so far as dependent on the spirit employed, has been reduced to its lowest limits, and the possession of furniture beautified by the exquisite polish imparted by the skill of the polisher no longer denied to those of more limited means.

In these departments of trade the benefit conferred has been of the most valuable description; but it is not confined to these. There are many others to which, by

means of the "finish," the benefit is extended; for, as it is allowed to be sold with the same freedom as any other manufactured article, in any quantity, and without restriction, every department of trade in which the small quantity of lac it contains does not operate as a bar in the way of its use, will be enabled to avail itself of the liberality of the Government, and hence "finish" may be expected to come into very extensive demand.

It is chiefly, however, with the employment of methylated spirits in chemical and pharmaceutical preparations that the Society has to do; and here a very wide field has been opened up, and we may expect that preparations which have hitherto been confined to the Continent will now attract the attention of the British chemist. At present, however, I would only notice a few of the more important; and first, Sulphuric ether. I need not say that this article is very largely used both in medicine and the arts. As a remedy in cases of asthma its value has long been recognized, and though it has been superseded by chloroform as an anæsthetic, its powers are not disputed, and long before these were published to the world one of my partners, then one of my apprentices, had a narrow escape from making the discovery of its virtues, for having breathed its vapour till its full effects were realized, he came, unfortunately, in contact with articles too brittle to bear the brunt of the encounter, and the damage done prevented any further experiments in that direction. Pity that it did so, as the benefit conferred on the human race by this application of a well-known remedy might have been sooner enjoyed. In the arts, ether has come into very extensive use, especially in the new and beautiful art of photography; and the question is, whether ether, prepared from the methylated spirit, will answer the different purposes for which it has been used equally well with that prepared from pure spirit of wine?

There is no difficulty in the preparation. The same process as is in use for making ether from alcohol suffices to make it from the methylated spirit, and accordingly it has been prepared at our laboratory in the same apparatus, and in the same manner. But when prepared, the question returns, What is it? Is it the ordinary Sulphuric ether? does it contain an admixture of methyl ether? and if it does, what effect has that admixture upon it? If an attempt be made to answer the first question by a reference to flavour, it will be difficult to do so, for the flavour does not differ, or differs very slightly indeed, from recently-made ether from alcohol, and the specific gravity may be made quite the same. In appearance and acting there is absolutely no difference. Its solvent powers appear to be the same; and, doubtless, it will be largely employed in all those operations in chemistry and pharmacy in which ether has hitherto been used. Again, we find that the two ethers closely resemble each other; they belong to the same series of compound radicals, whose general formula is Cn Hn + 1, Methyl being C_2 H_3, Ethyle C_4 H_5—and their oxides, or ethers, being formed by the addition of an atom of oxygen. The chief difference is in the greater volatility of the methyle, which, at a temperature below zero of Fahrenheit, remains a gas, and has resisted a pressure of 20 or 30 atmospheres, while ethyl is easily condensed under the ordinary pressure, and boils at 23° Fahr. (Gregory.) Their ethers in this respect also differ widely. Methylic ether "is a colourless liquid, of a peculiar ethereal smell, and liquid only at a temperature of 22° to 40°." (Regnault.) Ethylic ether is so well known that it need not be described. Both are obtained by the action of sulphuric acid on their respective alcohols; and when these liquids are previously mixed their ethers may be expected to come ever together, the one being soluble in the other, and, unless in so far as the greater volatility of the one may dispose it to separate from the other, and thus to pass into a state or gas, that union may be permanent. The extreme difficulty which the distinguished chemists who operated on this subject found in separating the two alcohols, and on which, indeed, the whole of the scheme is founded, renders it highly probable that it will be no easy matter to separate their ethers from one another.

As one means, however, of determining whether they are so combined in the ether prepared from the methylated spirit, the boiling point was taken. The boiling point of ordinary sulphuric ether is differently stated, and the first step was to ascertain its boiling point at the different densities of the Edinburgh and London Pharmacopœias, the former being .735 at 60° Fahr., the latter .750; the boiling point then of the former was ascertained to be 96° as given by Dr. Christison, the latter 98° Fahr.

The boiling point of ether prepared from methylated spirit at these densities was

found to be for density, .735 at 60° Fahr., 80°; and for .750, 82°; thus showing that the boiling point of the one is sixteen degrees lower than that of the other, and affording conclusive proof of the presence of methylic ether.

But what change does this make in the quality of the ether? The methylic ether remaining a gas at the ordinary temperature of the atmosphere renders it impossible to ascertain what its properties are in the separate state; but there is no reason to suppose that they differ much from those of ordinary sulphuric ether. It is polymeric with alcohol for $C_4 H_6 O_2 = 2 (C_2 H_3 O)$, and is described as being of ethereal odour. The explanation or theory of its production is the same, and its application and uses in the arts may also be the same. Could it be procured in sufficient quantity, it might even be found preferable for many purposes, especially in medicine, as it would necessarily prove a much more diffusible stimulus, and more useful as an antispasmodic.

But thinking it desirable to ascertain this point with some degree of certainty, and whether its internal employment would be perfectly safe, I resolved to try it upon myself, and not being able to procure any of the methylated ether, the oxide of methyl, I took the ether as now made from the methylated spirit, and found that its effects were precisely the same as those of the ordinary ether made from alcohol. The dose as stated by Dr. Christison, is from half a drachm to a drachm, ʒss. to ʒj. Having first taken the ordinary ether from alcohol to ascertain its effects, I took doses of the ether from methylated spirit, varying from ʒss. to ʒiij., and found the effects to correspond so nearly with those of other as to be unable to note any difference between them; the pulse remained unmoved, about 80, and the flavour given to the breath was precisely that of ether and ether alone; no trace of the ordinary flavour of the pyroxilic spirit was perceptible, and the effects were those of ether alone. The effect of the three-fluid drachm dose was, as might have been expected, more powerful; the pulse was slightly quickened, the heat of the skin a little augmented, and the flavour of the ether in the breath continued for a longer period; but there was no other effect perceptible. There was no pain of the head, no tinnitus aurium, no tendency to nausea, nor any unpleasant symptom whatsoever. Thus, so far as its employment as a remedial agent is concerned, I have no difficulty in affirming that it is quite as safe, and to the full as useful, as ether from alcohol has hitherto been found; though until I had tried it on myself, I could not have spoken of it so decidedly as I now venture to do. In like manner, I have no doubt but that it will be found equally valuable in the arts as the other; the experiments in photography are not yet perhaps sufficiently decisive to determine in what it may be employed and in what it may not; but the great reduction in price renders it a matter of sufficient importance to call for the utmost attention in examining the subject; and, doubtless, a short time will enable the lovers of this beautiful art to obtain the full benefit of the liberal intentions of the Government.

Chloroform.—Whatever difficulties or doubts may attend the determination of the fitness of the methylated spirit for the preparation of ether, none remain regarding its employment in the preparation of chloroform. At first, great doubts were entertained as to whether it would be possible to purify the chloroform thus prepared so as to render it fit for use as an anæsthetic agent. No doubt was entertained of the possibility of preparing it; for not only did the chemical composition of the spirit warrant the assurance, but chloroform had been prepared from pyroxilic spirit itself, and it is known that it may be prepared from various other things. The question was, Can it be freed from those oils which contaminate it as entirely as the chloroform made with pure alcohol?

In whatever way chloroform may be prepared, it is a definite compound—a terchloride of formyl. By Dumas' analysis it was found to consist of 2 equiv. of carbon, 1 hydrogen, 3 chlorine, $C_2 H Cl_3$. The materials for this are found both in alcohol and pyroxilic spirit. The latter being $C_2 H_4 O_2$, the former $C_4 H_6 O_2$, either of these, when distilled along with water and chloride of lime, supply the materials for chloroform. A definite compound being thus produced, it remains only to see that it is purified so as to render it safe for employment on the human frame. The vast amount of benefit that has been conferred on suffering humanity specially demands this attention in the preparation; and had it been found impossible so to purify it, nothing would have justified the use of the methylated spirit; alcohol alone would still have had to be employed. But it has been so purified, and the specimen now on the table will bear the closest

examination. The chief impurity to be guarded against is the presence of sundry oils formed in the process, and which rise along with it in the first distillation. These can be detected in two ways: 1st, by the action of sulphuric acid, and 2ndly, by the flavour. As to these, Muspratt says: "The rectified product should not tinge oil of vitriol when shaken with it, unless in a very trifling degree. If it colours the acid strongly, or, if when evaporated on the palm of the hand, it leaves an unpleasant odour, it is not fit for use." A still finer test of the flavour may be found in the employment of white bibulous paper; a little may be poured upon a piece of it, and its flavour watched until it evaporates so as to leave the paper dry. If the flavour continues the same throughout, the proof is complete that it is pure, for the oils referred to are more persistent than the chloroform, and when it has evaporated, their odour, if present, will display itself. The chloroform prepared from the methylated spirit stands these tests as well as that prepared from alcohol alone. Its specific gravity may also be referred to. "The rectified chloroform should have the specific gravity 1.49 to 1.50." (Gregory.) That from the methylated spirit has the specific gravity 1.50 at the temperature of 60° Fahr. It is necessary to mention this, for it has happened that some have tried the gravity without paying any attention to the temperature, and expected to find it exactly the same in the dog days as in the most intense frost. Chloroform from methylated spirit will be found to stand this test also quite as well as that from alcohol; and any chloroform found much under 1500 at 60° Fahr. should be rejected as in some way contaminated. But nothing is so important as the application of the article in medicine and surgery, and it is very satisfactory to be able to say that the chloroform thus prepared has been found equally effectual and equally safe with that prepared from alcohol alone. Nothing was wanting but this test, and this has been applied so as to leave no doubt whatever regarding it. It has been used in many cases, and its effects found not to differ in any way from those of chloroform prepared from alcohol alone. I need only, however, say that it has been used in the Royal Infirmary, under the eye of Professor Syme. In a recent operation of a protracted nature, in a case of necrosis, it was applied with entire success, and to-day I had an opportunity of witnessing the operation of excision of the shoulder-joint performed in the theatre of the hospital by that accomplished surgeon. The operation was performed in his usual dexterous manner, and promises a perfect cure, and to witness the patient, a young woman, lying unmoved on the operating table, entirely unconscious of the progress of the surgeon's knife, and in a state of as calm and quiet repose as if she had been merely enjoying a refreshing sleep, was a gratifying sight, exhibiting not merely the blessing conferred on suffering humanity by the use of chloroform, and the gratitude due to Professor Simpson on that account, but in this particular case satisfactorily proving that chloroform prepared from "methylated spirit" is as effectual, as safe, and as readily applied as that prepared from spirit of wine alone. Indeed, the learned Professor stated that he would give it the preference, inasmuch as it seemed to produce its effects more readily even than the other.

Thus we have another pleasing result of the liberality of the Government in this matter, as the British manufacturer is now placed on an equal footing with the foreign, the necessity for protecting duties done away, and the price greatly reduced to the public.

Spiritus Etheris Nitrosi should now occupy attention, but the length of the preceding remarks compels a postponement to a future opportunity.

Mr. Macfarlan then presented specimens of ether and chloroform prepared from the methylated spirit.

At the close of Mr. Macfarlan's paper some discussion took place, in which Dr. Macadam, Messrs. Robertson, Aitken, Ainslie, and Mackay took part.

Mr. John Mackay read a paper on

COMMERCIAL ACETATE OF LEAD,

With a Special Reference to the State of Purity in which it was found in the Market.

He referred to its use in pharmacy, the arts, in calico printing, oils, &c., and also to its value as a medicinal agent. Being an article moderate in price, he stated no great inducement existed for adulteration; and thought from this

fact, as well as from the remark in our Dispensatory regarding the rareness with which this article was adulterated or contaminated, the retail chemist was not upon his guard as to a careful examination of this compound before receiving it into his stock. He alluded to the phosphate of soda test as one which was distinctive when applied to prove the purity of acetas plumbi; but his experience had been in purchasing this article to select large crystalline masses, and to reject it when broken down into very small pieces, from the fear of admixture with dust, and the certain loss of a portion of the acetic acid, leaving portions of carbonate and uncombined oxide.

He proceeded to describe the manner in which his attention had been drawn to the impure specimen now placed on the table. A gentleman who painted extensively and successfully in oil, had been in the habit for several years of putting through a certain process portions of the acetate of lead, which he used along with other ingredients for the purpose of preparing a *medium* for mixing with, and applying his colours, and he had found that, though he had purchased the salt from various druggists, both in London and Edinburgh, he now and again encountered acetas plumbi so impure that he could not use it. With this statement he put into his hands the specimen now shown, accompanied with the remark that it was about the worst lot he had ever got, and was really totally useless.

Mr. Mackay stated he had examined the salt handed him by this party, and found it to contain fully thirty per cent. of a white insoluble powder. On a careful examination, this was proved to be almost entirely sulphate of lead, with a trace of carbonate, and a small quantity of organic matter. The salt now under consideration did not give to the eye the appearance of being so grossly adulterated, for although far from being a fine specimen, yet there were plenty of the peculiar bright needle-like crystals, and even small clusters of them quite visible.

The question, therefore, to solve, was whether this adulteration was accidental or intentional. He submitted to the meeting a calculation he had made, supposing a maker of this substance could be found so dishonest as to be guilty of purposely making and mixing sulphate with acetate of lead to the extent represented, with a view to profit, and the money difference between the genuine and adulterated salt he showed to be £2 per ton. This, supposing the sulphate to be made directly from the metal, and the acid might be termed the *chemical* view of the case; but he suggested that if the meeting could believe this adulteration to have been intentional, then the maker might very easily increase his profit threefold by using solph. plumb., obtained perhaps as the result of some other chemical manipulation, and which would be thus comparatively worthless. As it is well known that some of the cheap vinegars contain large quantities of sulphuric acid, it might be supposed that this was a probable source of the foreign ingredient; but the quantity of sulphate was in the present case so great that it was scarcely possible to be thus produced.

The conclusion, therefore, drawn by Mr. M. was, that whatever the causes of the adulteration, proved to have been present in the acetate now before the meeting, the fact was undoubted that an impure preparation had now and again been in the market, and that they as Pharmaceutists could not be too particular in attending to the purchase of such an article, especially as it was so valuable in the hands of the medical practitioner, and given in such minute doses.

Before closing, he submitted not only a specimen of the faulty salt itself, but also samples of the sulphate of lead he had obtained from the portion he examined, as well as three specimens of pure and three of the impure salt, treated exactly in the same manner, but producing remarkably different results.

A new die for Stamping Prescriptions, &c., was shown. Made by Hume and Melville, of Edinburgh. They answered every purpose, and were sold complete for 11*s.* 6*d.* each.

The SECRETARY read the following note from Professor George Wilson :—

"*Laboratory of Industrial Museum, Edinburgh.*

"TO THE PRESIDENT OF THE PHARMACEUTICAL SOCIETY.

"Sir,—Will you be good enough to communicate to the Members of the Society, as the fact is of interest to them, that having recently applied to the Commissioners of Inland Revenue for remission of the licence paid by me yearly for a still used in distilling water only, I have, through the exertions of the Board of Trade, obtained

remission of that tax; and am further informed by the officers of Excise, that they have been instructed not to charge in future for stills 'when these are used for experimental purposes.'

"How far this liberty will be practically extended, may be matter of question; but at least none of your Members need pay for water-stills, and it will be worth their while to contest the licence for other stills which are not employed to distil alcohol.

"I remain, yours very truly,

"JAMES GARDNER, ESQ." "GEORGE WILSON.

THE REGISTER FUND PRIZE ESSAY.

Subject:—"*The Best Mode of Preparing Tinctures.*"

Competitors, Associates and Apprentices belonging to the Society, residing in Scotland.

Essays to be sent, with sealed mottoes, to the Secretary, Mr. John Mackay, 121, George Street, not later than Saturday, 29th March.

The Prize Essay to be considered the property of the Society.

An improved Microscope was shown by Mr. Hart, Young Street, which the Society examined with much interest.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

Royal Institution, Thursday, 22nd November, 1855.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

THE SECRETARY announced the following donations to the Museum:—From Mr. Morson, of London, who was present, a specimen of Aluminium; and from Mr. Mercer, twenty models of Crystals and three specimens of Persian Naphtha. The Secretary also placed on the table specimens of Ether made from Methylated Spirit, and Collodion made with the Ether; and Mr. G. Barber called the attention of Members to an improved plan of preparing Syr. Croci, by which its colouring properties might be preserved for any length of time. It consisted in evaporating the syrup to dryness, and dissolving the powder in water when required for use.

Dr. EDWARDS then delivered a highly interesting lecture on "Frictional Electricity," which was illustrated by the extensive apparatus belonging to the Royal Institution, kindly lent him for the purpose.

The thanks of the meeting were voted to the donors to the Museum, and to Dr. Edwards for his lecture.

Royal Institution, Thursday, 6th December, 1855.

THE VICE-PRESIDENT, MR. H. S. ALPASS, IN THE CHAIR.

The SECRETARY announced donations to the Museum from Messrs. R. R. Jackson, G. D. Banks, and Mercer; and mentioned that Mr. Wilson, the Managing Director of Price's Patent Candle Company, had kindly promised to present the Association with a series of specimens, illustrating the products of their manufactures. A letter was read from Mr. Elliott, of Blisworth, on the subject of the patent vitreous iron slag, stating that that article could not only be prepared from the slag of iron furnaces, but also from common clay.

Mr. W. DANTEC then read the following paper:—

N A PROCESS FOR PURIFYING WATER FOR PREVENTING INCRUSTATION IN STEAM-BOILERS, AND OTHER PURPOSES.

The author commenced with a few introductory remarks on the nature and cause of the deposit usually met with in boilers.

The salts of lime impart to water the quality of hardness, which is of two kinds: that arising from the presence of carbonate of lime has been called temporary, because it could be removed by boiling and other means, while that which is caused by sulphate of lime has been termed permanent, because there was no remedy for it. The purifying process presently to be described provides a remedy for both the temporary

and permanent hardness by removing both the carbonate and sulphate of lime; these two salts of lime are the chief cause of incrustation, although there are other substances which are occasionally deposited with them. The incrustation which arises from sulphate of lime is much harder, and altogether more troublesome than that which is caused by the carbonate.

Carbonate of lime is not sensibly soluble in water unless the latter be charged with free carbonic acid, in which case carbonate of lime is taken up, and remains in solution. Most natural waters are charged with carbonate of lime held in solution in this matter. If these waters are boiled the excess of carbonic acid flies off, and the carbonate of lime is gradually thrown down, and forms incrustation.

Sulphate of lime is not rendered insoluble by boiling like the carbonate, but it is only soluble to a limited extent, and therefore when water, which holds it in solution, is supplied to a boiler, it soon becomes saturated, and then begins to deposit a hard coating on the interior of the boiler.

To obviate the difficulties and loss caused by incrustation, numerous plans have been proposed; these consist generally of the introduction of some substance into the boiler, which is supposed to be capable of preventing the formation of scale, or of removing it when formed; but it is manifest that any method of this kind adds to, instead of diminishing the impurities. Some of the substances which have been recommended, contain some acid which, by continually corroding the metal of the boiler, has a tendency to prevent anything from adhering to it. Such remedies as these, however, injure the boiler far more than the incrustation would do. Oak bark, oak sawdust, and substances of a like nature are of this class, and have been much recommended of late years; but they are only effectual in proportion to their corrosive effect, and therefore if they are used in sufficient quantities to prevent the scale from forming they will inevitably destroy the boiler in a short time. Oak and its bark contain considerable quantities of tannic acid; this is easily dissolved out by water, and has a powerful action on iron, as may be easily proved by steeping a quantity of the sawdust of oak in hot water, and after straining off the liquid into a glass, placing in it a piece of clean iron; the result will be that the liquid will in a short time turn perfectly black. As a proof of the evil effects of substances of this kind, I refer to a report of the performance of the United States steam-ship *Princeton*, published in the *Artizan* for the month of January, 1854.

I shall now proceed to describe the process by which water is purified before it enters the boiler; this is done by removing the contaminations which are the cause of incrustation, namely, the sulphates and carbonates of lime and magnesia, which may happen to be held in solution. To effect this, it is necessary to render these salts insoluble, so that they may be separated from the water—the agent employed for this purpose is hydrate of baryta.

No two substances have, when in solution, so strong an affinity for each other as sulphuric acid and baryta, and the affinity of the latter for carbonic acid is also much stronger than that of any other base for the same acid. Upon these superior affinities, and the insolubility of the resulting compounds, it is that the success of the process depends. Now, sulphate of lime consists of sulphuric acid; and lime, and carbonate of lime, of carbonic acid and lime. When hydrate of baryta is mixed with water, which contains sulphate of lime, the sulphuric acid immediately combines with it and forms sulphate of baryta, which being insoluble is precipitated. The lime is also thrown down, for hydrate of lime, which would result from the decomposition, is only very slightly soluble in water, much less so even than the sulphate, and moreover, as all waters which hold sulphate of lime in solution also contain some carbonate, even the small portion of hydrate of lime which the water is capable of holding in solution is immediately converted into insoluble carbonate of lime. In the same way, when hydrate of baryta is mixed with water containing carbonate of lime, held in solution by excess of carbonic acid, such excess of acid immediately combines with the baryta, and forms an insoluble carbonate of baryta, while the lime cannot remain in solution, because the excess of carbonic acid, by the agency of which it was rendered soluble, has been withdrawn.

I have stated the chemical action of hydrate of baryta with these two salts of lime separately, with a view of rendering the explanation as clear as possible, but in fact almost all waters contain a mixture of sulphate and carbonate of lime, in which case the baryta, following the law of chemical affinities, would first attract the sulphuric acid of the sulphate, and the resulting hydrate of lime at the instant of its formation

would combine with the excess of carbonic acid and would be precipitated as carbonate of lime, while the carbonate originally held in solution would also be rendered insoluble; thus the water is freed from both the sources of hardness, namely, the carbonate and sulphate of lime, the first being the cause of temporary hardness, and the last that which has been considered permanent, nothing being left in solution in place of the salts withdrawn, for all the baryta which was the means of effecting these changes is also precipitated in an insoluble state.

What I have here stated in reference to sulphate and carbonate of lime is equally applicable to the corresponding salts of magnesia and other bases.

Having now stated the theory of the process, and endeavoured to convey a general idea of the chemical changes which result from it, I may state that its practical application has been repeatedly tested, and always with perfectly satisfactory results, having now been in constant use on a large scale in several works for more than twelve months.

Besides its application for preventing incrustation, there are many other purposes for which the process is equally available, such as the operations of bleaching, dyeing, scouring, &c., all which require pure soft water. In the process of scouring, especially, there is always a waste of soap proportionate to the degree of hardness of the water used. This waste is prevented if the water be purified before use from the sulphate and carbonate of lime, which is easily done with the hydrate of baryta at a very trifling cost.

At the close of the paper some discussion took place, in which the Chairman, Mr. T. Edwards, Mr. Mackinlay, and other Members joined; and in answer to a question, Mr. Dantec stated he had secured the process by a patent, and that it was already in extensive use.

Mr. Mercer then read a paper on the "Theory of Positive Photographic Printing." He first alluded to the practical details of the process, and then explained and canvassed the merits of the different theories which had been put forth in explanation of the changes which result from the action of light and the fixing and colouring baths.

The thanks of the meeting were given to Messrs. Dantec and Mercer for their communications.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

The usual monthly meeting of this Association was held in the Lecture Room of the Society, on Friday evening, December 7th,

MR. WOOLLEY IN THE CHAIR.

Mr. Roberton exhibited a sample of cinchona bark which had recently been offered him as a new kind, under the name of Carthagena Bark; it is in quills and flat pieces, the inner surface of the larger pieces presenting a fibrous character. Being offered at a low price, and somewhat resembling calisaya bark in colour, there is much danger that it will be powdered and substituted for the latter.

Some conversation ensued on the subject of methylated spirit and the preparation of ether and chloroform therefrom, in which Messrs. Woolley, Greenhough, Richardson, and others took part. It seemed to be the opinion of some that the large consumers and manufacturers would receive all the benefits of its introduction; but it is difficult to perceive how the cost of production can be reduced in any branch of trade without all the persons connected with it being benefited.

A paper was then read

"ON SUGAR—ITS PHARMACEUTICAL USE,"

BY MR ROBERTON,

of which the following is an abstract:

This substance, which holds an important place in an industrial, domestic, and sanitary point of view, and presents remarkable features in its transformation to the chemist and physiologist, is not without its interest pharmaceutically.

The name of sugar is applied to those bodies of a ternary composition and sweet flavour, which are soluble in water, and under the influence of a ferment can by a direct or indirect action become changed into alcohol and carbonic acid.

We are acquainted with four principal kinds of sugar, each of which presents to us different characters.

1st. Crystallizable cane sugar, C_{24} H_{22} O_{22}.
2nd. Granular or grape sugar, C_{24} H_{28} O_{28}.
3rd. Uncrystallizable sugar of fruits. All these are capable of direct fermentation.
4th. Sugar of milk. Crystallizable, but not susceptible of direct fermentation.

After describing the various properties of each of these varieties of sugar, the method of distinguishing them, and the conversion of one into the other, Mr. Roberton referred to its use in Pharmacy as follows:

It owes its employment to its sweet taste for the purpose of covering the flavour of nauseous medicines, its antiseptic properties—resisting the process of oxidation, and as a convenient substance for the purpose of reducing to a state of minute division some active remedies.

The medicaments largely incorporated with sugar in our Pharmacopœia are the syrups, honeys, and confections. The chief advantages of the employment of syrups are that they offer the remedy in an agreeable form, and enable us to present certain vegetable matters which cannot be retained alone in a state of constant preservation.

In order, however, that this latter condition may be perfectly fulfilled, certain precautions are necessary ; otherwise, instead of insuring the preservation of our product, we introduce a fruitful source of destruction. The sugar must be pure, the syrup must neither be too limpid nor too concentrated. It should be perfectly transparent, having been clarified by boiling, filtration, or the use of albumen in certain cases. To insure the good preservation of the syrups, they should never, if possible, be subjected to a temperature above 60°. A frequent cause of the deterioration of a syrup is the presence of vegetable albumen and starch, as is the case in the syrup of poppies. To obviate this, the French Codex has wisely ordered the employment of the alcoholic extract. The price of spirit has of course hitherto precluded its use for the extraction of such a bulky material as the poppy capsule. A modification, however, of this process I have long made use of, with much satisfaction, which consists in treating a carefully prepared watery extract with rectified spirit, by which means the vegetable albumen and mucilaginous matter are removed. The alcoholic extract is then added to its proper proportion of syrup. Might not a similar mode of treatment with the green extracts be adopted with advantage? A class of preparations, which I cannot but think are variable in their strength, unstable in their preservation, and unscientific in their character. I think the attention of the Pharmacopœia Committee might be usefully directed to this subject. But this is a digression.

The French have also a syrup of ipecacuanha, prepared from the spirituous extract. This is a preparation which appears to me to possess several advantages over our wine, which we must all admit is variable and inelegant. Such a syrup is not liable to change, and as a children's remedy seems more eligible for administration than the wine.

Having briefly noticed the honeys and confections, and referred to the opposing action of sugar in the formation of peroxide of iron—which property was also shown to be possessed by glycerine,—and having suggested a few instances in which sugar might be advantageously substituted for alcohol in the preservation of some vegetable products, the paper concluded as follows, by a reference to sugar of milk, and a recommendation for its more frequent employment as a means of subdividing active remedies:—"As a part of the homœopathic system, this appears to be not the least important. Without resorting to the fanciful notions of its founder, in the importance bestowed on shakings and triturations, until the infinitesimal attenuation is achieved, and the drug receives a magic power, may we not usefully bestow a little more attention to this subject within *rational* limits ? and as the value of small doses in some cases is being increasingly recognized, their minute and accurate division is doubtless a matter of considerable importance."

At the conclusion of the paper a discussion arose, in which Messrs. Holyoake, Wylde, Woolley, and others took part. Mr. Woolley thought that some of the preparations proposed in Mr. Roberton's paper were worthy of an extended trial.

Some syrup of taraxacum, which Mr. R. had prepared from the expressed juice, possessed the flavour of the fresh root in a remarkable degree.

A vote of thanks to Mr. Roberton for his paper was proposed by Mr. Lynch, which being seconded by Mr. Holyoake, was carried unanimously.

There will be no Evening Meeting of the Society during the month of January.

ORIGINAL AND EXTRACTED ARTICLES.

ON *WOOD OIL*, A SUBSTITUTE FOR COPAIBA.

BY DANIEL HANBURY.

Among the drugs that have recently appeared in the London market, I have observed one article to which I am desirous of drawing attention. It is a liquid imported in considerable quantity from Moulmein in Burmah, and offered for sale under the name of *Balsam Capivi*, but known in India as *Wood Oil* or *Gurjun Balsam*.

To Balsam of Copaiba, however, it presents so remarkable a resemblance, that, but for the locality from which it was imported, it would hardly have been noticed as anything else than Copaiba of rather unusually dark colour.

In the Paris Universal Exhibition there are two samples of a similar liquid, labelled *Wood Oil*, one of them being sent among the Materia Medica of Canara, the other from the Tenasserim provinces. Through the kindness of Dr. Royle, specimens of each have been placed at my disposal. Though comparatively a new drug in English trade, *Wood Oil* is an article of common occurrence in the bazaars of India.

From its similarity to Copaiba, it might be supposed to have its origin in some plant nearly allied to *Copaifera:* such, however, is not the case, it being the produce of the natural order *Dipterocarpeæ*.

The following is Roxburgh's account of the manner of obtaining it from *Dipterocarpus turbinatus*, an immense tree, native of Chittagong, Tipperah, Pegue, and other places to the eastward of Bengal.*

> "This tree is famous over all the Eastern parts of India and the Malay Islands, on account of its yielding a thin liquid balsam, commonly called *Wood Oil*, which is much used for painting ships, houses, &c.
>
> "To procure the balsam, a large notch is cut into the trunk of the tree, near the earth (say about 30 inches from the ground), where a fire is kept up until the wound is charred, soon after which the liquid begins to ooze out. A small gutter is cut in the wood to conduct the liquid into a vessel placed to receive it. The average produce of the best trees during the season, is said to be sometimes 40 gallons. It is found necessary, every 3 or 4 weeks, to cut off the old charred surfaces and burn it afresh; in large healthy trees abounding in balsam, they even cut a second notch in some other part of the tree, and char it as the first.
>
> "These operations are performed during the months of November, December, January and February. Should any of the trees appear sickly the following season, one or more years' respite is given them."

The same author also states that Wood Oil is afforded by *D. costatus* (*D. angustifolius* W. et A.), *D. alatus* Roxb. and *D. incanus* Roxb., the last mentioned being reputed to furnish the largest proportion of the best sort.

Closely allied to the Wood Oil of *Dipterocarpus* is the oleo-resin termed *Camphor Oil*, produced by *Dryobalanops Camphora* Colebr., a tree of the same natural order. For a specimen of this oleo-resin and of an analogous liquid called *Lagam Oil*, both brought from Sumatra by Dr. Junghuhn, I am indebted to the courtesy of Dr. J. E. De Vrij of Rotterdam.

Wood Oil, as imported from Moulmein, is, after filtration, a transparent, dark brown liquid, of somewhat greater consistence than Olive Oil, a sp. gr. of .964 and an odour and taste like copaiba, though perhaps hardly so strong. One part of it treated with two parts of alcohol sp. gr. .796, is dissolved with the exception of a minute quantity of darkish flocculent matter, which subsides upon repose.

But its most curious property (as noticed by Mr. Charles Lowe with reference to a liquid which I suppose to have been *Wood Oil*†) is that exhibited when it

* *Flora Indica* (ed. Carey) vol. ii. p. 613.

† On a new variety of Balsam of Copaiba—*Pharmaceutical Journal*, vol. xiv. pp. 65, 66.

is heated in a *corked* vial to about 266° F. (130° C.).* Thus treated, it becomes slightly turbid, and so gelatinous that the vial may be inverted, even while hot, without its contents being displaced; and on cooling, the solidification is still more complete. Gentle warmth and agitation restore to a great extent its fluidity, but solidification is again produced upon the liquid being heated to 266°. Copaiba displays no such phenomenon.

According to Dr. O'Shaughnessy, when Wood Oil is heated in a retort, a yellowish white, *crystallizable*, solid substance having many of the properties of benzoic acid sublimes into the upper part of the vessel, to the extent of about one per cent. of the Wood Oil taken. In my own experiments, I have not detected any of this substance. It is true that when Wood Oil is heated, a scanty, opaque white sublimate condenses in the cooler part of the vessel, but this appears to arise from the condensation of a little water among the minute drops of essential oil, since it is not produced if the Wood Oil has been previously agitated with some fragments of dried chloride of calcium.

With regard to its medicinal properties, there appears to be no doubt from an extensive set of experiments instituted by Dr. O'Shaughnessy, confirmed by trials made by other practitioners in India, that Wood Oil is nearly equally efficient with Copaiba, in the diseases in which that drug is indicated.† It may be administered as an emulsion, or in pills made up with magnesia. Dr. O'Shaughnessy has used the essential oil in doses of from 10 to 30 drops.

From the close similarity of Wood Oil to Copaiba, a mixture of the two may be anticipated; from pure Copaiba, such a mixture will probably be detected by a difference in its optical properties.

REDUCTION OF SILVER.

BY MR. J. WIGGIN.

Of late years the various photographic processes have been so extensively worked in the country, that the sale of chemicals and apparatus for them has established itself as a new and important part of our profession. In common with many others I have frequently had occasion to purchase of my customers various of their silver solutions, which, from some cause or other had ceased to work properly, and had consequently become comparatively useless to any one but a Chemist.

As my process for the reduction of silver differs considerably from any I have seen published, I thought that, as being simple, quick, and cheap, it might be of some service to others similarly situated. It is based on Professor Gregory's formula for reducing oxide of silver from chloride, and that of M. Casaseca, as published in vol. xi. p. 367 of the Pharmaceutical Transactions. I precipitate the silver as chloride. After well washing and breaking up, it is put into a boiling solution of one part of hydrate of potass and two parts of water. This is boiled for five minutes, and whilst on the fire, one part of simple syrup, of the Ph. Lond., is gradually poured in with constant stirring. A violent effervescence takes place, and the black powder, suspended in the potass solution, immediately falls down as metallic silver. I well wash the precipitate and dry it, after which it may be used for the manufacture of any silver salt.

Ipswich, December 11, 1855.

THE PREPARATION OF BLUE PILL AND GREY POWDER.

BY W. W. STODDART.

The preparation of these two most important articles, when the directions of the Pharmacopœia are strictly followed, is a very tedious process, so much so that most druggists generally order them from a wholesale house, not thinking it worth their while to compound their own. Now that a new Pharmacopœia is under consideration, and every one expected to give a hint or two if possible, I am induced to give my mode of manipulation, as I am not aware of its being

* Mr. Lowe says 230° F., but a much more striking effect is produced on the *Wood Oil* by the temperature I have named.

† *Bengal Dispensatory* (1842), pp. 222—224.

followed by any one else. A most intimate and perfect division of the metal is effected in a very short time and with comparatively little trouble,—and with this recommendation, that the ingredients are in every respect the same as the Pharmacopœia formula.

Pil. Hydrarg.—To make this I triturate the mercury with the *powdered liquorice* (adding a small quantity of distilled or rose water) till the globules are quite imperceptible, the confection of roses is *next* added and all well mixed. The rapidity with which the liquorice "kills" the mercury is really astonishing to one accustomed to the old way of rubbing the metal with the conserve. It forms a perfectly homogeneous mass of a proper pill consistence.

Hydrarg. cum Cretâ.—For mixing this, I first put the mercury into a bottle with an equal weight of prepared chalk, and well shake them together till the metal is invisible to the naked eye, which takes place in a few minutes. I then turn it out into a large Wedgwood mortar and rub with the remainder of the chalk till the globules are no longer visible. The time consumed by these modes of operation is so short, that there can be no excuse for any one not preparing their own blue pill and grey powder, which it is obviously their duty to do, especially in a more exclusively dispensing establishment. A pound of blue pill was made as above in one hour, in which no globules were discoverable, even by a Coddington lens.

9, *North Street, Bristol, Nov.* 19, 1855.

[The process for making grey powder is similar to that now generally adopted by wholesale druggists, the mercury and chalk being put into a cask which is turned on an axis.—Ed.]

SUPPLEMENTARY REMARKS BY DR. HASSALL.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In order that no misapprehension may exist as to the views entertained by me on the subject of the adulteration of annatto, I have to request the insertion of this letter in the forthcoming number of the *Pharmaceutical Journal.* This is the more necessary, as certain speakers who addressed the Society attributed opinions to me which I disclaim.

In my communication to the Society, I showed that the samples of annatto subjected by me to microscopical and chemical analysis contained the following substances :—

Turmeric in large quantities was present in three samples ; *wheat* and *barley* flour in four ; *rye* flour in nine, and this in several samples, to the extent of at least 40 per cent. ; *carbonate of lime* or *chalk* and *sulphate of lime* in a great many samples, to the amount of from 50 to over 60 per cent.; *red ferruginous earths*, as *Venetian red*, in a great many; *salt* in a great many; *alkali* in many ; *lead* in five samples—in two as traces only ; and *copper* in at least four samples.

The accuracy of these results was fully confirmed by the reports—the one microscopical, and the other chemical—by Mr. Hogg and Dr. Bernays ; nor was their correctness disproved in the smallest degree by Mr. Redwood, or any of the other speakers who addressed the Society.

Now I regard the whole of the substances above enumerated, excepting the alkali, as adulterations. At first I was disposed to consider that a little flour might be required, and that the copper detected was present only as an impurity or contamination. I am now satisfied that starch is not necessary, and that if it were so, nothing could justify its introduction in the enormous quantities in which it is used ; and with respect to the copper, it appears from Mr. Redwood's admission, that it too must be regarded as an intentional admixture.

Not being able to deny the presence of these various substances in annatto, Mr. Redwood took up just the line of defence which I foresaw he would adopt ; and he sought to justify the use of the majority of these substances, by having recourse to certain pleas, much used by manufacturers in defence of a great variety of adulterations. Thus, it was stated that some of the additions made were improvements —that they were necessary, in order to adapt the article for use, and to make it keep. On these pleas the use of "a little" starch, chalk, sulphate of lime, red

earths, and sulphate of copper in annatto, was defended. Of salt and turmeric Mr. Redwood said nothing, and he avoided the question of *quantities* in all cases except those in which lead was present.

My object in thus describing the line of defence followed by Mr. Redwood, is to show more clearly its fallacies.

In the first place, I deny that the premises upon which this defence rests are correct, and I affirm that no addition to annatto is requisite except alkali, to render the colouring matter more soluble; and I base this statement in part upon the following facts and particulars :—

That annatto *is fit for use in the state in which it is imported*, is shown by the fact that it is constantly purchased and used in that state, without any addition to it whatever except alkali, by dyers, soap-makers, and others. I have long been acquainted with instances of this kind.

That annatto *will keep in the state in which it is imported*, without any addition, can also be readily proved. I have small samples of annatto as imported in my possession, which I have had for more than two years, and they are as good as ever they were. I have also known soap-makers who have kept annatto for a period equally long, it being perfectly sound at the end of the time.

Mr. Redwood stated that the reason why annatto will not keep as imported, is that it is too soft and moist, and that it cannot be dried without being spoiled. I will undertake to accomplish this object without spoiling the annatto; but the following fact is nearly conclusive on this point. In order to facilitate the incorporation with the annatto of the large quantities of turmeric, flour, chalk, &c., found in so many of the samples sold in this country, *water is added*, the excess of this being afterwards got rid of by drying. Without water it would be perfectly impossible to mix with annatto 40, 50, and 60 per cent. of flour and chalk.

Further than this, I am satisfied that some of the substances added, so far from improving the keeping properties of the article, injure them; thus the addition of such large per-centages of different kinds of flour and salt are injurious—the salt attracts moisture from the air, and the moisture spoils the flour and predisposes to mouldiness. It is after the following receipt that nearly all the roll annattos are made up in this country—large quantities of flour, usually that of wheat, barley, or rye, are added to the annatto; this so reduces the colour, that, in order to bring up the tint, it becomes necessary to use salt, the effect of which substance in intensifying most vegetable reds, is so remarkable. Now annatto, thus prepared, exposed to the air, attracts moisture, becomes soft, and soon spoils.

For the sake of argument we will suppose that, as Mr. Redwood states, "a little" flour, chalk, &c., are necessary, but can it be pretended that 40, 50, and even 60 per cent. of these substances are requisite? and if it could be shown that they were necessary, then I maintain that the article thus admixed, thus reduced, *ought not to be called annatto at all*, but that some name should be affixed to the compound which indicates its actual composition. Were this done, then the names of some of the samples, the results of the examination of which are recorded in my Paper on Annatto, would stand somewhat thus, *Mixture of turmeric, chalk, and annatto*; *rye flour, salt, red earth, and annatto*; *chalk coloured with annatto.*

A few words more and I have done. Mr. Redwood admitted that *sulphate of copper* is added to annatto for the purpose of making it keep better, and of preventing the growth of mould in cheese. Knowing as much as I do of the practices resorted to in the adulteration of various articles of consumption, I am not surprised at the use of that substance, but I am astonished that any one should defend its employment, and especially astonished was I at the reason assigned by Mr. Redwood in justification of its use, namely, that sulphate of copper was employed in Belgium in bread-making without hurtful consequences. Verily, strange practices find defenders. But what are the facts regarding copper in bread? Of these, as I showed in my reply, Mr. Redwood was singularly ignorant. Immediately that it was discovered some years since that certain dishonest bakers in Belgium had recourse to the use of sulphate of copper to whiten bread, and to cause it to hold more water, the employment of that substance *was prohibited under the severest penalties.*

Mr. Redwood, after enumerating in the *Pharmaceutical Journal* for November the various substances—the flour, chalk, salt, red earth, &c.—which I stated, in my evidence before the Committee of the House of Commons, I had found in the samples of annatto I had examined, made this remark, referring to the manufacturers of annatto. "These parties denied that there was *any truth* in the statements which

had been published." What have the manufacturers to say now? Who is right, they or Dr. Hassall? I remain, Sir, your obedient servant,

Bennett Street, St. James's Street, ARTHUR H. HASSALL.
December 14, 1855.

Note.—In my evidence before the Committee of the House of Commons, I stated that I had found lead in five samples of annatto. At that time I had not determined the quantities, although I had obtained the most satisfactory proofs of its presence. There is no reason why annatto should contain even "traces" of lead, much less 1.20 per cent. of oxide of lead.

[It is difficult to reconcile Dr. Hassall's paper and his admissions during the discussion with the above letter, although the former has been considerably modified by the author since it was read.—ED.]

THE DETECTION OF ALUM IN BREAD.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—A gentleman, remarkable for eccentricity of words and peculiarity of thought, in his speech reported in your Journal, alluded to some process described by me for detecting alum in bread. On looking over my evidence I find the following, which in fairness I ask you to insert:—"2123. Mr. Wise.—Can you suggest any simple means by which the public could detect alum in their bread? By taking a slice of bread, crumbling and placing it in a basin, pouring over it a quantity of boiled rain-water, and allowing it to remain for some time, filtering the solution on pouring it off, and evaporating to dryness; and then dissolving it again in a little more water, filtering the solution; and on adding a little ammonia or hartshorn, alum (alumina) itself will appear shortly as a cloudiness in the fluid, and ultimately will subside to the bottom. I have been told that another practicable mode is by introducing a hot knife into the centre of the loaf. If it adheres to it, it is a sign of the presence of alum." In the reply, the word *alum* is printed for alumina, the chief base of the salt.

Mr. Redwood calls this a process—says it is a very absurd process. I do not so dignify it. I say it is an ordinary proceeding, sufficiently accurate for ordinary purposes. So I believe the Committee received it, and so any ordinary person would understand it. Perhaps the best thing Mr. Redwood can do, is to peruse carefully his own evidence, and reflect on it.

I am, Sir, your obedient Servant,

41, *Frederick Street, Birmingham, Dec.* 4, 1855. JOHN POSTGATE.

[We quite agree with the writer that the so-called process "is an ordinary proceeding," or rather an *extra*ordinary proceeding for such a purpose. It is calculated to deceive the public, as it has, no doubt, deceived Mr. Postgate. It is scarcely necessary to observe that the precipitate thrown down by ammonia would form no criterion of the quantity of alumina present, but might consist entirely or in part of other substances.—ED.]

CASE OF SUSPECTED POISONING BY STRYCHNINE.

AN inquest, extending over Wednesday, Friday and Saturday, was held at Rugeley, before Mr. W. W. Ward, Coroner, on the body of John Parsons Cook, who died on the 21st of November. Mr. Cook was the owner of the horse Polestar, which was entered at the Shrewsbury races on the 13th and 14th of November, when the horse won. While at Shrewsbury, after the race, Mr. Cook was taken suddenly ill and was removed to Rugeley, where he had been staying, and died in five days after his return. The first witness, Mr. William Henry Jones, surgeon, Lutterworth, deposed that he had known the late John Parsons Cook intimately, saw him before his death at Shrewsbury, when he was in good health. On the following Monday morning received a letter from Mr. W. Palmer, surgeon, of Rugeley, stating that Mr. Cook had been taken ill at Shrewsbury, and obliged to call in a medical man—that he was in bed suffering from bilious diarrhœa, and thought it advisable that he (Mr. Jones) should come and see him as soon as possible. Witness came to Rugeley about three o'clock in the afternoon of Tuesday, and found Mr. Cook in bed. Shortly after Mr.

Palmer came to see him, and about seven o'clock Mr. Bamford, another medical gentleman, whom Mr. Palmer said he had called to his assistance. It was then arranged what should be given him during the night, and was proposed by Mr. Palmer and Mr. Bamford that the morphine pills should be repeated as on the previous night, and was suggested by Mr. Palmer that Mr. Cook should not know what the pills contained, as he strongly objected to them on the previous night, because they made him so ill. About eleven o'clock Mr. Palmer came and produced the pills which he gave to Mr. Cook, who made strong protestations against taking them, saying he was sure they made him ill the night before. At twelve o'clock witness went to Mr. Cook's bedroom, and at his suggestion slept there; had not been in bed more than a quarter of an hour, when Mr. Cook suddenly jumped up in bed, saying, "Doctor, I am going to be ill; ring the bell for Mr. Palmer." Mr. Palmer, who lives opposite, was sent for, and he came in two minutes. Making the remark that he thought he never dressed so quickly in his life, he gave the patient two pills, which he said contained ammonia. Immediately after taking the pills he uttered loud screams, and threw himself back in the bed in very strong convulsions; he then requested to be raised up, saying, "I shall be suffocated." This was found impossible as he was so stiffened with spasms; and in a few minutes he died.

Mr. G. T. Devonshire, Assistant to Mr. Monckton, of Rugeley, was next examined. He deposed to having made the *post mortem* examination, which he said showed nothing to account for the sudden death of the deceased. There were some small white spots on the lower end of the stomach, for which he was unable to account.

Mr. J. T. Harland, M.D., of Stafford, also spoke to the *post mortem* examination, and agreed in the description given by the last witness. Was perfectly unable, from the examination, to account for death.

Mr. William Bamford was examined. He first saw Mr. Cook (at the request of Mr. Palmer) about three o'clock on Saturday, Nov. 17. Found him suffering from violent vomiting. The stomach being in a most irritable state, prescribed saline medicine, which was taken away by Mr. Palmer. Between seven and eight o'clock in the evening, was again requested by Mr. Palmer to visit Mr. Cook. Sickness still continued. Everything being ejected from the stomach, gave two small pills as an opiate, which were taken away by Mr. Palmer, witness not accompanying him. The following morning Mr. Palmer again called, asking witness to accompany him. Sickness still continued. Visited the deceased again in the evening with Mr. Palmer. Went on Monday morning and changed his medicine. Gave him a draught which relieved the sickness. Did not see him again till Tuesday night, when a change had taken place. He was irritable, and troubled in his mind. Threw himself on the bed, and said he would have no more pills, nor take any more medicine. Mr. Palmer asked witness to make two more pills similar to those on the previous night, and to write the directions on a slip of paper, which witness did, and gave the pills to Mr. Palmer.

Dr. Alfred Swain Taylor, of London, to whom the stomach and intestines of the deceased had been sent for analysis, asked Mr. Bamford some questions as to the composition of the saline medicine. Mr. Bamford was then further examined. He had attended other patients for Mr. Palmer. Attended Mrs. Palmer some days before her decease. Also two children and a gentleman from London, who was on a visit at Mr. Palmer's house, and who did not live many hours after he was called in. The whole of those patients died. Mr. Palmer made application to witness for a certificate of Mr. Cook's death on the following Sunday morning, when witness objected, saying, "He is your patient;" but afterwards filled up the certificate.

Dr. Taylor then detailed his analysis, in which he was assisted by Dr. Rees, by which they failed in discovering any poison—the result being that antimony was found in the body, which must have been taken while living; but there were no apparent causes of death.

Elizabeth Mills, chambermaid at the Talbot Arms, who attended Mr. Cook, described his illness.

Dr. Taylor having inquired whether there was any external wound, or laceration of the body, which might have caused tetanus, and being answered in the negative, said—"My belief is, that he died from tetanus, and that tetanus was caused by medicine given to him shortly before his death." In reply to the Coroner, Dr. Taylor said, I believe that the pills administered on Monday and Tuesday nights

contained strychnine, and am of opinion that no other poison would have produced the symptoms which had been described.

Charles Joseph Roberts, Apprentice to Mr. Hawkins, Chemist, of Rugeley, deposed that on the 20th November last he sold six grains of strychnine to Mr. William Palmer, surgeon, of Rugeley. Had sold strychnine before, but to none but medical men. Mr. Palmer purchased at the same time two drachms of prussic acid and two drachms of Battley's solution of opium.

Ishmael Fisher, Wine Merchant, London, was at the Shrewsbury Races, where he met Mr. Cook and Mr. Palmer at the Raven Hotel, when Mr. Cook said that his brandy and water was "dosed," and requested witness to take charge of his money.

Skaife Gibson, Assistant to Mr. Heathcote, Surgeon, of Shrewsbury, remembered being sent for to see Mr. Cook, who complained of pain in the stomach, and said he thought poison had been given him with his brandy. Recommended an emetic, but Mr. Cook drank some warm water, which returned quite clear. He afterwards, on application, prescribed a draught to quiet the system.

At the adjourned inquest, on Saturday, George Herring, of Albert-terrace, Hatton Park, Surrey, was examined and gave evidence respecting the betting transactions, and the money which Mr. Cook had in his possession at the races.

Elizabeth Mills was recalled, and stated that during Mr. Cook's illness she noticed a small clasp-book on the looking-glass. It had since been looked for, but could not be found; about ten minutes after Mr. Cook was dead, she found Mr. Palmer in the room searching the pockets of a coat, which she thought to be Mr. Cook's, also looking under the pillows and bolster. Mr. Jones also found Mr. Palmer with Mr. Cook's coat in his hand. Several other witnesses were examined, and the coroner having summed up, the jury, after six or seven minutes' deliberation, declared their finding to be that "The deceased died of poison, wilfully administered to him by William Palmer." The warrant for committal was then made out.

Circumstances have transpired tending to establish other charges against Palmer. It is said he insured his wife's life for £13,000; she died shortly afterwards. He then induced his brother, Walter Palmer, to insure his life for the same amount, and afterwards obtained the transfer of it on an alleged debt of £400, which he stated was due to him by his brother; he endeavoured to further insure this life; but in consequence of an anonymous letter, it was declined. He also endeavoured to effect an insurance for £25,000 on the life of a "Gentleman," whom he reported to live on his estate. It was found that others in high position had conspired with Palmer to falsely represent the standing in life of this individual, who was, in fact, Palmer's occasional groom, renting a room at 2*s*. per week.

INGENIOUS FRAUD.

A Correspondent has sent us an extract from the *Hampshire Independent*, containing a report of a remarkable case of fraud on Mr. Emanuel, a pawnbroker at Southampton, who advanced money on certain casks, represented as containing valuable polish. The defendants were Benjamin Francis Oakey and John Fargher, one of whom, on the 6th of October last, pledged for 8*s*. a jar of varnish and another of polish, the name given being John Webster, New Road, Southampton. They afterwards pledged larger quantities of similar goods. Several casks or tins, containing about twelve gallons each, were offered, and samples drawn, which were submitted to Mr. Randal and Mr. Dowman for examination. The same being pronounced to consist chiefly of methylated spirit, worth about 7*s*. 6*d*. a gallon, the required sum was advanced. The amount, viz., £40, not being paid at the time stipulated, a further examination took place, when it was found that the casks contained a small quantity of methylated spirit, which floated on the surface, under which was a hard substance, found to be chiefly shellac, the bulk of the contents consisting of size and water. In the course of the inquiry it transpired that Mr. Aldous, foreman to Mr. Emanuel, had called on the defendants, obtained their confidence and their secret, with an offer of a share of the profit—which latter he declined. It appeared that the compound had been prepared for the purpose of raising money. The defendants, when detected, admitted their guilt, but declared that they only required temporary accommodation, and intended to have redeemed the articles. They were both committed for trial, the magistrates offering to accept bail, themselves in £100 and two sureties in £50 each.

NOTES ON THE CHEMICALS IN THE PARIS UNIVERSAL EXHIBITION, 1855.

(*Continued from page* 272.)

[We have been reminded that the names of May and Baker, of Battersea, who exhibited a collection of chemicals, were omitted in our notes of last month. Also Hirst and Brooke (Leeds), who exhibited wood-naphtha, acetic acid, indigo, with other chemicals, dies, &c. It is not impossible, that among the immense collection of products, others may have escaped notice—our report having been a sketch of the articles which attracted our attention, and not a complete list.]

No. .—Rousseau Frères, à Paris. A choice collection of chemicals, including fine specimens of Aluminium and an interesting series of the materials employed in its separation, viz., Alumina, Alumina and Carbon, Chloride of Aluminium, Sodium, product of the action of Sodium on Chloride of Aluminium. The Sodium is in ingots five or six inches in length and one-half to three-quarters of an inch in thickness, the price marked upon the label is 100 francs per *kilogramme* (about 2*s.* 4*d.* per oz.). This very low price is attributable to the stimulus which the production of Sodium has received since it has been employed in separating Aluminium, and a further reduction in its cost is expected. The comparative abundance of so valuable a reagent as Sodium cannot but prove a boon to scientific chemistry. Potassium is exhibited in the same collection, price 350 francs per *kilogramme*.

All the specimens in this collection are of moderate size, and are displayed in a neat, unostentatious manner. It is an excellent exhibition.

No. .—Bobée, Lemire père et ses fils, à Choisy le Roi. A magnificent specimen of crystallized Acetic Acid; several other samples of Acetic Acid and Acetates.

No. 3931.—Armet, Steinheil et Vivien, à Paris. Several Salts of Quinine and other products derived from Cinchona bark. The whiteness of the Sulphate of Quinine appeared to us scarcely equal to that of some other samples. The specimens of Nitrate, Hydrochlorate, Citrate, Tannate, and Acetate of Quinine are fine.

No. 3946 (Suppl.).—Labarraque et Cie., au Havre. An interesting collection of Cinchona barks, with fine specimens of products derived from them, Sulphate of Quinine, Quinidine, Sulphate of Cinchonine, &c.

No. 3935.—Berjot, à Caen. A considerable collection of Pharmaceutical extracts, prepared *in vacuo*, with a model of the apparatus employed in their manufacture. Most of the extracts are completely desiccated, but as in all similar instances something beyond mere inspection is required to appreciate their properties.

No. 3948.—Dorvault, Pharmacie Centrale à Paris. A very good exhibition of pharmaceutical and chemical preparations, with a few drugs. Very fine specimens of Urea, Morphia, Iodoform, Cyanide of Potassium, &c., beautiful crystals of Nitrate of Silver, brilliantly iridescent Bismuth, specimens of the resins of Scammony and Jalap of a remarkable appearance.

Among the raw drugs in this collection we noticed Cedron Seeds, the Oriental extract of Indian Hemp, called *Haschisch*, Sumbul root, Paullinia or Guarana paste from Brazil, Monesia bark, &c.

No. 2336.—Coignet père et fils, à Lyon. Samples of products obtained from bones, &c., including Amorphous Phosphorus, Prussiate of Potash, Animal Black, Glue, Gelatine, Subphosphate of Lime for the manufacture of porcelain, &c.

Samples of Salt obtained from various sources are numerous. Very fine specimens of Rock Salt in different stages of manufacture are exhibited by the Compagnie des Salines de l'Est, Lillo et Cie. (No. 155), as well as specimens of Sulphate of Soda, Chloride of Potassium, &c., derived from *bittern*.

The collection of Agard and Prat (No. 139) contains several products derived from sea-water. It was to these manufacturers that the Council Medal was awarded in 1851 "for Salts of Potash and other products of Sea-water."

Among chemical products are included many specimens of preparations used in dyeing and painting, and there are perhaps no other displays in this department of the Exhibition so pleasing to the eye, as the collections of wools and cottons in shades of every hue, reduced to powder for the manufacture of flock papers: such are the contributions of Burgh et Cie., of Paris (No. 2493), and of Cerceuil, also of Paris (No. 2945).

Exhibitions of Ultramarine are numerous and beautiful.

No. 3131.—Parquin, Legueux et Cie., à Pourrain, is an interesting collection of twenty-four fine specimens of Red and Yellow Ochre, crude and prepared.

No. 3034.—Peter, Guinon et Cie., à Lyon. A nice collection of Indigos and Orchils, with four specimens of Picric Acid, two in crystals and two in the condition of a pasty mass. There are several exhibitions containing similar products.

No. 3039.—Reber, à Sainte-Marie-aux-Mines. A very interesting exhibition, consisting of specimens of Uric Acid and two samples of Alloxan, obtained from the guano of Peru; with specimens of wool, of a fine purple colour, dyed with Alloxan.*

No. 4773.—Desmoutis, Chapuis et Cie., à Paris. A fine collection of rare metals; magnificent apparatus in platinum for the concentration of Sulphuric Acid, the largest exhibited. In the principal vessel and the tube connected with it, the use of the gold soldering generally employed, has been dispensed with. Drawn platinum tube of various sizes, crucibles and other vessels of the same metal also without soldering are exhibited.

The still exhibited by Messrs. Johnson and Matthey (see p. 270) is gilt within, a plan which, we are informed, these manufacturers have recently adopted with great advantage. The improvement was suggested by the fact that the gold in old stills is found to be far less acted upon by continued use, than the platinum which it has been employed to solder.

It may not be out of place here to notice the excellent character of the dividing and engraving on glass that are met with in Paris. Thermometers divided on the tube, eudiometer and alkalimeter tubes, and ordinary measures for fluids are marked with a neatness to which we are unaccustomed in England. These remarks are fully justified by the beautiful specimens included in the collection of Chemical apparatus No. 1945 exhibited by Clech et Deroche, of Paris.

The Austrian contributions which have principally attracted our attention are some excellent collections chiefly from Prague and Vienna, among which we may mention the following, taking them in the order in which our marks occur in the catalogue.

No. 363, &c.—Batka, à Prague. A considerable collection of chemicals, including several of the rarer metals, &c., some dried herbs of no great excellence, also two magnificent medicine chests for the Prince of Servia. The chests are of good size and well arranged to avoid loss of space; they are made of rosewood, richly inlaid with metal, and marked with the arms of the prince; the bottles are cut and gilt, with armorial bearings, and the label painted upon each; the scales and other appliances are in corresponding taste.

No. 367.—Fr. X. Brosche et fils, à Prague. Magnificent specimen of Succinic Acid, Salts of Uranium and Chromium, Racemic or Paratartaric Acid, &c.

No. 410.—Huber, près de Prague. Very fine sample of Acetate of Lead in crystals,—we noticed none superior.

No. 449.—Wagenmann, Seybel et Cie., près de Vienne. A considerable collection of chemicals, among the more noteworthy of which may be mentioned

* Vide *Pharm. Journ.*, vol. xiv. p. 30.

fine crystals of Tartaric and Citric Acid, Sal Ammoniac, Rochelle Salt, Nitrate of Soda, Tartrate of Ammonia in large crystals, &c.

No. .—Bittner, à Brünn (Moravie). A collection of medicinal plants, including a specimen of Moravian Rhubarb, &c., a sample of Lepidolite, marked three and a quarter florins per quintal.

No. 554.—Lamatsch, à Vienne. A good collection of chemical and pharmaceutical preparations, among which may be mentioned a beautiful specimen of clear transparent sherry-coloured Resin of Jalap, Salts of Morphia and Strychnia, some very white Amygdaline, large sample of Amorphous Phosphorus, &c.; also a collection of the Ethers which have recently been employed, when mixed with Alcohol, to imitate the flavours of various fruits; as the apple, pear, strawberry, pineapple, &c. The Ethers exhibited are the Amylic, Butyric, Valerianic, and Capric. There is also in this collection a large medicine chest, containing a great variety of articles, but neither the arrangement of the chest nor the assortment of its contents appeared to us at all judicious.

No. 145.—Johanny, à Bielitz, Silésie. Specimens of Austrian Rhubarb, the produce of *Rheum Emodi* Wall. (*R. Australe* Don.).

From Prussia the following deserve note as among the more interesting contributions:

No. 313.—Manufacture Royale de Produits Chimiques, à Schonebeck, près de Magdebourg. A considerable collection of chemicals, including some magnificent specimens of Sodium and Potassium, also a fine sample of Glacial Phosphoric Acid.

No. 321.—Marquart, à Bonn. In this exhibition are some artificial flavours, such as essence of pears, Acetate of Amyle; essence of apples, Valerianate of Amyle; essence of wine, Œnanthic Ether, &c.; also a specimen of Sulphide of Carbon, of which we believe Dr. L. C. Marquart was one of the earliest manufacturers, a considerable number of Bromides, Valerianic and Butyric Acids, Collodion and several chemicals used in Photography.

No. .—Heymann, à Bonn. Fine specimen of Prussiate of Potash, manufactured by a process in which the requisite proportion of nitrogen is derived exclusively from the atmosphere.

No. 327.—Trommsdorf, à Erford (Saxe). This is by far the finest and most interesting collection of chemicals contributed by Prussia. The specimens are numerous and excellent, and are displayed with good taste. Amongst them we noticed a beautifully white sample of Helenine or Elecampane-camphor, also white feathery crystals of Arbutine, a principle derived from *Arbutus Uva ursi*; Æsculine, the crystallizable principle obtained from Horse-chestnut bark, which has of late become of great interest from possessing, in even a greater degree than Quinine, the power of producing the appearance termed *fluorescence*. Also fine specimens of Cubebine and Solanine, the latter very white; a specimen of Styracine in small white crystals, Asparagine, Amygdaline, beautiful sample of Caffeine, Chloraniline (? which) in glistening golden plates resembling Iodide of Lead, Cinnamic Acid in large lamellar crystals, a bottle of beautiful orange-brown needles of Picronitrate of Potash, Alloxan, Nitro-prusside of Sodium, Ammonio-nitrate of Nickel, fine specimens of Glacial Phosphoric and Chromic Acids, and many others, some of them sadly obscured by the case.

Among the contributions in this class from Belgium and Holland we saw but little worthy of notice. The Vieille Montagne Company has exhibited some fine samples of Zinc White. There are also from Belgium some magnificent crystals of sugar, the faces of some of which are fully four inches across. Among other essential oils we observed a specimen of Oil of Rhodium, distilled from the wood, by Van Enst and Dyk of Amsterdam. This oil is also distilled in Paris. Some of the collections of chemical and pharmaceutical preparations from Belgium and Holland are of quite an inferior character.

From Norway we observed an interesting case of Ores from the Silver Mines of Kongsberg, including several specimens of arborescent and crystallized silver

of remarkable beauty. From the same country there is an instructive collection, illustrative of the Cobalt manufacture as conducted at the mines of Modŭm Blaafarve Værke, Drammen. It includes twenty specimens, viz.:

1. Superior Cobalt ore, crushed and washed.
2. Superior Cobalt ore, crushed and washed and roasted.
3. Inferior Cobalt ore, crushed and washed.
4. Inferior Cobalt ore, crushed and washed and roasted.
5. Iron and Cobalt, Arsenide and Sulphide, obtained from the smelting of inferior ores.
6. The same refined and roasted.
7. Hydrated $\frac{4}{3}$ Oxide of Cobalt.
8. Protoxide of Cobalt.
9. Phosphate of Cobalt, pink.
10. Phosphate of Cobalt, blue.
11. Sulphide of Cobalt.
12. Oxalate of Cobalt.
13. Cobaltocyanide of Potassium.
14. Cobaltocyanide of Cobalt.
15. Best commercial Smalt, marked H.B.E.
16. Best commercial Smalt, marked H.B.C.
17. Arsenious Acid, unrefined.
18. " " once refined.
19. " " twice refined.
20. " Arsenic Glass."

The States of Sardinia have furnished fine collections of mineral produce. That exhibited by the Institut Royal Technique, à Turin (No. 2), is admirably arranged. It includes upwards of 1200 specimens of marbles, building materials, ores, and minerals. There are also large specimens of ores of Iron, Copper, and Lead, exhibited by various mining companies. The large specimens of marble are very beautiful,—we regret to notice that many fine slabs have been broken in transport.

F. Genin, of Chambéry (No. 62), exhibits a series of mineral colours, including fine specimens of a considerable number of Ochres.

From these brief notes we trust that our readers will be able to discern some of the more prominent features of those departments of the Paris Exhibition, which it is within our province to notice. There is much to stimulate the enterprise of British manufacturers in the collections of foreign produce which this Exhibition has brought under their observation. There is nothing to discourage, though at first sight, in the class to which our notes principally refer, it might appear otherwise, considering the comparative insignificance of the British contributions. But these Universal Exhibitions, admirably instructive and useful as they are, must be, beyond certain limits, very imperfect exponents of national capability and progress. Circumstances, such as locality, ease of transport, custom and excise arrangements, &c., will unavoidably exercise a powerful influence on the number and character of the contributions from different countries in any given class. Experience has abundantly proved the truth of this assertion, and a comparison of the exhibition of chemical and pharmaceutical products of 1851 with that of 1855 affords it a strong confirmation.

The 2nd class of the Official Catalogue of 1851 included the chemical and pharmaceutical products. In the Paris catalogue they are placed in the 1st section of the 10th and 4th section of the 12th classes. The total number of exhibitors in the 2nd class in 1851 was 270, of whom there were

British 138 . . . . . Foreign 132

The numbers in the above-mentioned sections of the Paris catalogue (exclusive of the supplement) for the four countries which have most largely contributed, are as follows:

Great Britain 41. . . . . France 166
Austria 39
Prussia 30

From this it is evident that the manner in which the resources of a country are represented, by the voluntary contributions of independent exhibitors, is very uncertain.

Among the foreign contributions there are some in Paris, as there were in London,

which are remarkable for the great variety of the specimens exhibited; evincing, we must conclude, a large amount of scientific knowledge, as well as practical skill, on the part of the manufacturer. From the character of the contributions in several other classes the same inference may be drawn; and hence it would appear that our neighbours have surpassed us in successfully blending the systematic instruction of the college with the experimental teaching of the laboratory and the workshop. We sincerely desire that the industrial exhibitions, which in recent times have taken place, may produce their legitimate effect in rousing the emulation of our countrymen, and convincing them of the necessity of more systematic and extended education among those classes of the community on whom eventually must depend the industrial reputation of Great Britain.

NOTES ON THE MATERIA MEDICA OF THE PARIS UNIVERSAL EXHIBITION, 1855.

(*Continued from page* 269.)

Jamaica.—Under the auspices of the Jamaica Society of Arts, whose services on this occasion are deserving of great praise, a considerable collection of products illustrating the resources of the island have been forwarded to the Exhibition. These specimens, which, previous to being sent to Paris, were exhibited in Kingston, Jamaica, are enumerated in a catalogue printed by the Society, a document containing much useful information, though inconveniently arranged and but little adapted as a guide to the collection as we find it in Paris. It is however far more copious than the Official Catalogue,* and we shall therefore quote from it.

The following are among the more interesting specimens:—

119, 144, 211.† Bitter Wood, *Quassia excelsa* Sw.; and 218. Cups turned from it, in using which nothing more is needed for producing a wholesome, *bitter*, morning draught than filling them to the brim with water over-night. The virtue will last in them a very long time.

359. China Root, *Smilax Pseudo-china* L. (not *S. China*, as in Catalogue), much used medicinally by the natives.

364. Sarsaparilla Root.—Dr. Dewar, St. Elizabeth's Parish, Jamaica. A starchy Sarsaparilla of a pale cinnamon colour; appears identical with the sample at Apothecaries' Hall referred to by Pereira. (*Elem. of Mat. Med.* II. 1165.)

499, 500. Chew Stick Powder prepared from *Gouania Domingensis* L. and used as a dentifrice.

498. Hog-berry Bark,—plant not ascertained, useful as an astringent.

501, 502. Wild Cinnamon Bark, incorrectly referred in the catalogue to *Canella alba*. This *Wild Cinnamon* is stated to be often sold in Jamaica as true cinnamon, from which, however, it is quite different, even in appearance. Its botanical origin is not determined. Specimens from Messrs. W. J. Wilkinson and L. R. Valpy.

505. Bark and Wood of the Macary or Majoe Bitter, *Picramnia Antidesma* Sw. A valuable tonic may be prepared from the bark and leaves.—From Rev. T. Wharton.

528. Hog Gum, a brownish, opaque resin, melted into a bamboo.

529. Hog Gum, a bright yellow, opaque substance in masses of some size. Both these substances are referred to *Moronobea coccinea* Aubl. They are contributed by the Rev. T. Wharton.

638. Bark of the Burn-nose Tree, *Daphne tinifolia* Sw.—From Dr. C. Campbell.

394. Nutmegs preserved in spirit. Mr. N. Wilson, Curator of the Bath Botanical Gardens, writes:

---

* *Paris Universal Exhibition* 1855.—*Catalogue of the Works exhibited in the British Section of the Exhibition in French and English.* London: Chapman and Hall. 1855. (Price 10d.)

† The numbers correspond to the Jamaica Catalogue.

"The nutmeg, *Myristica moschata*, has been proved to thrive admirably in Jamaica, particularly in a humid locality, and will bear fruit in 6 or 7 years from planting, producing two crops annually. A tree in the Botanical Garden at Bath, 15 feet in height, putting out branches to the ground, matures from 900 to 1000 fruits annually. The nutmeg-tree requires but little cultivation, and could readily be grown here to any extent."

410, 411, 412. Seeds of *Moringa pterygosperma*.
517. Oil of ditto.
526. Gum of ditto.
413. Nuts of *Aleurites triloba*, Spanish Walnut.
516. Oil of ditto, extracted by boiling the kernel.
419. Castor Oil Seeds, *Ricinus communis*.
513A. Castor Oil. Large quantities are prepared in the island, by decoction, some of the oil being dark and some light-coloured; but little, if any, is exported.
360. Pindar Nuts or Ground Nuts, *Arachis hypogæa*.
513. Oil of ditto.
404. Sand-box Seeds, *Hura crepitans*.
515. Oil of ditto, prepared by decoction, purgative in the dose of 20 drops or less.
629. Leaves of the Bitter Bush, *Eupatorium parviflorum* (?), an alleged specific in Asiatic cholera, fevers, &c.

The collection of farinaceous substances is very large and interesting, as the following, extracted chiefly from the catalogue, will show:

469B. Affo Yam Meal, *Dioscorea aculeata*.
369. Affo Yam Biscuits.
470, 471, 472, 473. Arrowroot, *Maranta arundinacea*, manufactured in Jamaica.
463. Bitter Cassava Meal, *Jatropha Manihot*.
443. Bitter Cassava Starch, *Jatropha Manihot*.
485, 486. Bread Fruit Biscuits, *Artocarpus incisa*, procured by slightly peeling the fruit, slicing it and drying it in the sun. A most nutritious food and one which keeps well; prepared for use as the Cassava Cakes (*v. infra*), it is very delicious.
457. Bread Fruit Meal, *Artocarpus incisa*.
452. Broad Bean Meal, *Phaseolus latisiliquus*.
480. Cassava Cakes, *Jatropha Manihot* (*Manihot utilissima* Pohl.). Lightly toasted and buttered, a very nice *morceau*; they give richness and consistency to soups and made dishes.
461. Cassava Meal, *J. Manihot*.
456, 475. Coco Meal, *Colocasia esculenta*, grated and washed.
464. Coco Second Meal, Quaqua Starch.
466. Cuckold's Increase-pea Meal, *Dolichos unguiculatus*.
469. Gongo or Congo Pea Meal, *Cajanus bicolor*. A nutritious article of food.
458. Guinea Corn Meal, *Sorghum vulgare*.
453, 469C. Indian Corn Meal, *Zea Mays*.
447. Ipomœa Starch, prepared from a species of *Ipomœa*,* the enormous tuberous root of a single plant sometimes yielding from 20 to 50 lbs. of starch. It grows in some parts of Jamaica in very great abundance, but the fæcula obtainable from it, is not much known.
370. Jew Coco Biscuits, *Colocasia esculenta* var.
448. Mango Starch (*Mangifera Indica*). Mangoes are superabundant;—in season from May to September. The green mango yields a pure starch in large

* Printed in the Catalogue *Ipomœa Horsfoldiæ* or *Horsfaldiæ*, a name we cannot identify. We are assured, however, that it is not the *Ipomœa Horsfalliæ* of Hooker.

quantity, and a spirituous liquor can also be obtained from it. The other valuable properties of the mango are well known.

367. Negro Yam Biscuits, *Dioscorea sativa.*

459. Negro Yam Meal.

468. No-eye Pea Meal, *Cajanus flavus.*

455. Ochra Powder, *Hibiscus esculentus,* valued in cookery on account of its glutinous properties.

465. Orange-rind Meal, *Citrus Aurantium,* used for seasoning.

449, 450, 451. Plantain Meal, *Musa paradisiaca,* prepared by slicing the green plantain fruit into thin pieces, drying them in the sun and pounding or grating. The meal forms a highly nutritious food for infants, and is excellent for puddings; it would well repay him who cultivates the plantain for its fibre, when he could not otherwise command a market for the fruit.

460. Pumpkin Meal, *Cucurbita Pepo.*

467. Red Pea Meal, *Phaseolus nanus.*

446. Sour Sop Starch, *Anona muricata.*

444, 445. Sweet Cassava Starch, *Jatropha Janipha.*

462, 474. Sweet Potato Meal, *Convolvulus Batatas.*

454. Sugar Bean Meal, *Phaseolus saccharatus.*

479. Tapioca made from the root of the Bitter Cassava, *Jatropha Manihot (Manihot utilissima).*

368. White Coco or Eddoe Biscuits, *Colocasia esculenta* var.

371. White Yam Biscuits, *Dioscorea alata.*

469A. White Yam Meal.

442. Zamia Starch, *Zamia integrifolia?* This plant grows in great abundance about Negril at the west end of the island. It was recognized by the Hill Coolies when they first arrived. The starch is sold at 6*d.* per lb.

Saint Domingo.—Sir Robert H. Schomburgk, British Consul in this island, has contributed a large number of specimens of Wood, several samples of Wax, some of it produced by a species of *Myrica*, Guaiacum Resin, Pods of *Cassia fistula* and *C. Brasiliana*, &c.

Cuba—has sent some specimens of chemicals from the manufactory of Dr. Ambrosio C. de Sauto, Matanzas: among them we observed Strychnia of good appearance, acetate, bisulphate, citrate, hydrochlorate and valerianate of quinine, some salts of mercury, &c.

From the Bahamas and from Barbadoes and Grenada, there are very small contributions relating to Materia Medica; and from the large island of Trinidad we have observed none at all.

Guadeloupe—has sent Vanilla, a variety in short cylindrical pods new to us, Cinnamon Bark, Ben Nuts (*Moringa pterygosperma*), Cloves, also a substance called *Résine de Bois*, the produce of an *Icica.*

Martinique.—Tonka Beans, Cloves, Fresh Turmeric, Musk Seeds called *Graines d'Ambrette* produced by *Hibiscus Abelmoschus*, and pods of *Hymenæa Courbaril* are contributed from this French colony.

Mexico.—In the fine collection of objects presented by this country to the Paris Exhibition, occur some interesting specimens of Mexican drugs, of which we have noted the following:

Winter's Bark.—After comparison with authentic specimens, we have little hesitation in referring this bark, which is very different from the *Cortex Winteranus* of the shops, to the *Drimys Winteri* of Forster. The South American species of *Drimys*, namely, *D. Winteri* Forst., *D. Chilensis* De C., *D. Granatensis* Linn. fil. and *D. Mexicana* De C., are now regarded as constituting but one species, to which the old name *Drimys Winteri* is applied.*

Ecorce de l' arbre *Nauché*, astringent.

Ecorce de Chine (?).

---

* Dr. J. D. Hooker, *Botany of the Antarctic Voyage.—Flora Antarctic*, part ii. p. 229. Also *Bot. Mag.*, Aug., 1854, where the plant is beautifully figured Tab. 4800.

Bois de Huaco, *Aristolochia* sp.

Bois d'Aloes, marked *Lignaloe*, *Fagara lignaloë*. This extremely fragrant wood is the *Bois de Citron du Mexique* of Guibourt,* and quite distinct from the *Lignum aloës* of pharmacy, which is the produce of Cochin China and Siam. Professor Guibourt describes it thus:

"It is internally white, with slightly brownish very irregular longitudinal veins. It is very light, porous and possessed of a very strong odour of citron. It contains so large an amount of essential oil that one might suppose it had been impregnated with it by immersion, for this essence condenses in little drops upon the sides of the vessel in which it is enclosed."

The specimen of this wood sent to Paris is a fine piece, completely perfuming the large glass case containing the collection.

Essential Oil of Lignaloe, a small vial.

Nephritic Wood, though not labelled, was recognized by Professor Guibourt: some good-sized pieces of it are in the collection. The botanical origin of this rare wood, which retained a place in the London Pharmacopœia of 1721, is undetermined. An infusion of the heart-wood is of a golden brown and beautifully exhibits (like a solution of quinine) the phenomenon called *fluorescence*.

Résine d'Archipin, an opaque, yellow, hard resin.

Résine de Tulla.

Axe or *Axin*, according to the catalogue,† unctuous matter of *Cocus axin* (?).

(*To be continued.*)

OBITUARY.

WILLIAM A. HALLOWS.

Mr. Hallows was born at Islington on the 29th of January, 1805, and received his education from Mr. Lemon, of Holloway, and afterwards from Mr. Burrell, of Leatherhead, Surrey. He was apprenticed at the age of fourteen to Mr. Johnson, of 147, Oxford Street, and commenced business at Islington on the 1st of February, 1828. He died at his residence, Canonbury Park, on the 18th of December, the cause of death being atrophy of the heart, with disease of the coronary vessels.

Mr. Hallows was one of the founders of the Pharmaceutical Society, was formerly on the Council, and also served as Auditor. He has lately declined to accept office, although several times proposed. He was universally esteemed and respected by his pharmaceutical brethren, and was a zealous promoter of the Benevolent Fund, as well as other useful and charitable institutions.

BOOKS RECEIVED.

The First Step in Chemistry.—A New Method for Teaching the Elements of the Science. By Robert Galloway, F.C.S.

A Catechism of Chemical Philosophy; *being a Familiar Exposition of the Principles of Chemistry and Physics, in their application to the Arts and Comforts of Life.* By John Horsley.

The titles of these little works explain their purport and general scope to some extent. They are quite of an elementary character, and suitable for schools, or as first books to be put into the hands of apprentices, for which purpose we can recommend them to the notice of our readers.

The Literary and Scientific Register and Almanack for 1856. By J. W. G. Gutch, M.R.C.S.L., &c. London: David Bogue, 86, Fleet Street.

This almanack contains as usual a large amount of useful information in a very small compass.

De La Rue's Medical Memorandum Book and Indelible Diary, 1856. Edited by a Physician. De La Rue and Co., London.

A review of Mialhe's *Chemistry in its application to Physiology and Therapeutics* is unavoidably deferred, as well as some other articles, for want of space.

---

* *Hist. des Drog.* t. iii. p. 491.

† *République Mexicaine.—Catalogue des Produits naturels, industriels et artistiques exposés dans la Section Mexicaine à l'Exposition Universelle de* 1855. Paris, 1855. 8vo. pp. 54.

TO CORRESPONDENTS.

CHEMISTS' EARLY CLOSING ASSOCIATION, LIVERPOOL.—We have received a report of an evening meeting of the above, with the loyal, patriotic, and appropriate toasts drunk on the occasion. The proceedings were enlivened with songs, and CLOSED EARLY (in the morning).

J. C. (Wandsworth).—We shall be very glad to see the Index completed.

T. L. O.—We think the effect of the article will be transient, and a repetition of it would answer no good purpose.

The Concentrated Marine Solution, exhibited by Mr. Hains at the Pharmaceutical Meeting, is intended for the extemporaneous production of sea-water for baths, and also for marine vivaria.

P. P. (York, *alias* Yeovil).—The writing is rather better, but profession is usually written with one f. The cleaning of windows is a matter of arrangement between the master and the apprentice or his parents.

J. T. (Bath).—(1.) *Microcosmic Salt.*—A double salt, obtained by mixing equal parts of phosphate of soda and phosphate of ammonia in solution, and evaporating it to crystallization.—(2.) Muspratt's *Plattner on the Blowpipe.*

M. P. S.—The ointment prepared as stated will not be deficient in efficacy.

Tyro (Exeter).—See vol. iv. page 148.

Verus (Liverpool).—(1.) The "ammonia test" for balsam of coapiba cannot be relied on; indeed, no one test is sufficient to prove the genuineness of this substance. —(2). The best mode of testing oxide of zinc, is to dissolve it in dilute nitric acid, avoiding much excess of acid; then to add to a part of the solution nitrate of baryta, to another part nitrate of silver. Pure oxide should dissolve without effervescence, and the solution should yield no precipitate with the reagents mentioned.

Chemicus (London).—(1.) The specimen of fruit forwarded to us is the *Peccan Nut*, the produce of *Carya olivæformis*, Nat. Ord. *Juglandaceæ*. It is closely allied to our walnut, which it resembles in flavour. It is obtained from America.—(2.) By means of spirit, with addition of a little conserve of hips.

Classic (Edinburgh).—*Selecta è Prescriptis.*

Chemicus (Stockport).—(1.) *Iodide of Ammonium.*—See page 192 of this volume.—(2.) We cannot recommend the use of the extract in making *Succus Conii.*—(3.) No.

H. N.—(1.) The Tincture Press figured in our last number can be obtained in Paris, on an order being sent.—(2.) Numerous recipes of the kind required will be found in Beasley's *Druggists' Receipt Book.*—(3.) India-rubber varnish may be made by dissolving one pound of India-rubber in a quarter of a pint of rectified coal naphtha.

A. Z. (St. Alban's).—(1.) Pure protosulphate of iron.—(2.) We are unable to give the information.

Enquirer.—Palm oil should be as much as possible excluded from light and moisture.

A Junior Apprentice (Bradford).—Alcohol or ether.

C. S. G. (Stratford-on-Avon).—(1.) A pneumatic trough is indispensable for collecting oxygen gas, if it be required pure.—(2.) Yes.—(3.) Möhr and Redwood's *Practical Pharmacy*, 6*s*. Taylor and Co.—*S.* (Forfar).—Lindley's *School Botany.*

Alumina (Sunderland).—*Chloride of aluminium* may be made by calcining in a covered crucible a mixture of pure precipitated alumina and lamp-black, and transferring the mixture to a porcelain tube, fixed across a furnace, and heating to redness in a stream of chlorine gas.

E. E. (Weymouth).—Glass tubes are made in the process of glass blowing, by rapidly drawing out a hollow cylinder.

A Member (Manchester).—The change observed in the sulphate of magnesia referred to, is caused by some impurity—probably chloride of magnesium, with a trace of iron.

ERRATA.

Page 263 of last number, 8th line of second paragraph, *for* oil, *read* silex; *for* Naphia, *read* Raphia; *for* N. tædigera, *read* R. tædigera.

Page 264, *for* Guincenis, *read* Guineensis; *for* Phytilephas macrocarpa, *read* Phytelephas macrocarpa.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. SMITH, Secretary, 17, Bloomsbury Square, before the 20th of the month.

THE PHARMACEUTICAL JOURNAL.

VOL. XV.—No. VIII.—FEBRUARY 1st, 1856.

ERRATA.—In the first page of the Numbers for December and January, *for* No. V., *read* No. VI.; *for* No. VI., *read* No. VII.

PROFESSIONAL ETHICS.

Each profession has its own conventional rules for the general guidance of its members. Such rules, whether expressed and enacted in a tangible form, or merely sanctioned by usage and common consent, are acknowledged as the criterion of propriety and respectability, any deviation from which is held to be "unprofessional."

A similar understanding exists among the representatives, or leading members of the various trading bodies; and a disregard of the customary and recognised principles of action is, in like manner, repudiated as "untradesman-like."

The object of these regulations is the mutual advantage and elevation of the parties concerned; and while it is optional with each individual to what extent he complies with the self-imposed restrictions of the class to which he belongs, it is understood that any material deviation from the course prescribed involves a corresponding loss of caste, and a forfeiture of any privileges or protection resulting from the *esprit de corps* and mutually beneficial arrangements subsisting among the orthodox members.

The rules which are adopted with a view of maintaining the dignity and status of a profession differ materially from those which prevail in an ordinary trade; and as Pharmacy, which was formerly a mere trade, is now acquiring a professional character, it is reasonable to expect a corresponding improvement in the conduct of the Pharmaceutist in his customary business transactions. This change, however, must be a work of time. It would be impossible to introduce a sudden revolution in the habits, prejudices, and mental qualifications of a numerous and formerly disunited class of persons. Some are less disposed than others to keep pace with the times; and until the present generation has passed away and given place to successors educated according to the modern principles, we must not expect the reformation to be complete.

The progress towards this desirable result may be expedited by the adoption of a code of ethics, having for their object a definition, so far as it may be found practicable, of the principles and conduct which may be most calculated to assimilate Pharmacy with the character of a profession, and to discourage practices degrading or inconsistent with the status which it is the intention of the Pharmacy Act to confer on those who come under its operation. This plan has been resorted to in America with a good effect, and although no compulsory measures are in force, it is found advantageous to discuss from time to time the principles which are recommended for the general guidance of the members. The regulations to which we refer are published in our number for February, 1853, and relate to the maintenance of harmony and good-fellowship among the members, the denouncement of quackery and disreputable practices, the faithful and efficient performance of the duties of the Pharmaceutist in the preparation and dispensing of medicines, the promotion of the advancement of the art and science of Pharmacy, the discouragement of encroachments on the province of the medical practitioner, unprofessional amalgamation on the "per-centage system," and other abuses resulting from excessive competition, when unrestrained by the principles of fair and honest dealing.

These rules are issued in the form of recommendation, not in the belief that they will immediately be acted upon by all the members of the body, but as a standard to which all are advised to aim, as being conducive to the general good, and calculated to elevate the profession of Pharmacy.

A similar code of ethics would be productive of a good effect in this country.

When we consider the position of the Pharmaceutical Society, as the body empowered by Act of Parliament to regulate the qualification of Pharmaceutical Chemists, it might be supposed that this Society would exercise a care and oversight over its members, with a view of maintaining a proper standard of responsibility and professional conduct among those who possess and exhibit the certificate of membership. This impression prevails, we believe, to a considerable extent; and we frequently receive communications from correspondents, complaining of what is supposed to be the negligence of the Council in allowing members to conduct their business in a disreputable manner, issuing disgraceful advertisements and hand-bills, and thus bringing discredit on the Society. It would seem to be expected by some of our readers that, immediately on the passing of an Act which is not retrospective in its operation, but which provides for the qualification of future Pharmaceutical Chemists, the entire body would forthwith become transformed from mere tradesmen to scientific professional Chemists. That this is the tendency, and will in process of time be the result of the movement, we see no reason to doubt; and we fully participate in the regret expressed by our correspondents at the examples adduced with a view of showing that the desired reform has not yet been accomplished. But we do not feel discouraged on this account, believing that it is in the power of the Pharmaceutical Society, by directing attention to the subject, and issuing a code of ethics for their guidance, to hasten and promote the infusion of a professional and honourable feeling among the members, incompatible with the practices which are too often a source of complaint.

We have before us a pile of hand-bills and advertisements issued by Chemists announcing themselves as Members of the Pharmaceutical Society, and which reflect no little discredit, not only on the parties themselves, but on the body with which they claim connexion. Some of these puffs are very disgraceful. In several instances they have been forwarded to us by gentlemen wishing success and prosperity to the Society, and desiring to know whether the individuals so exposing themselves to animadversion are actually members, and whether the attention of the Council has been directed to the subject.

Unfortunately we have at present no remedy for the evil complained of. There is no law defining the precise boundary-line between a legitimate announcement and a disreputable puff. Although some of the specimens before us are obviously of the latter class, and such as the friends of the Society must regret to see circulated by any of its Members, it would not be easy to frame a regulation which would satisfactorily meet the exigency of the case. The subject was alluded to at the last anniversary of the Society by the President, in his address to the Members, and it is one which deserves further attention. It is the primary object of the Society to raise the qualification of its Members, and in so doing, the natural consequence will be the elevation of the tone and character of the body. Without any officious interference with the private or domestic arrangements of individuals, in the mode of conducting their business, the Society may and should exercise a salutary influence over its Members, by the adoption of such regulations as they may among themselves consider to be conducive to their welfare and professional credit.

ADULTERATION AND FRAUD.

In good faith, and with no other object than the establishment of the truth, we pointed out the errors into which an excess of enthusiasm had led certain sanitary reformers. The fact that we did not swallow entire all the statements put forward by these gentlemen under the name of evidence, was made the pretext for a variety of misrepresentations, the fallacy of which we have exposed. In so doing we have explained the grounds of our dissent, and pointed out the impropriety of circulating random and exaggerated assertions.

Carefully avoiding any allusion to the real question at issue, our opponents continue to reiterate, in various forms of phraseology, the same quirks and sarcasms, with scraps of evidence and other quotations ingeniously misconstrued and perverted. We shall not descend to this line of argument (if argument it can be called) with parties whose object is, not to arrive at the truth, but to quibble about words, to invest the subject with a colouring favourable to their own peculiar line of action, and to raise a prejudice against those who will not be imposed upon by the substitution of fallacies for facts.

The public will derive benefit from the discussion which has taken place on the general subject of fraud and adulteration, and time will bring all parties concerned in the controversy to their just and proper level. The honest and consistent promoters of the desired reform have nothing to fear from any sinister attempts that may be made to pervert or misrepresent their statements. They will not shrink from exposing any cases of imposition which may come under their notice from time to time, whether in the sale of adulterated articles or the promulgation of erroneous ideas.

Those who have taken up the subject with a view of turning the public fears to profitable account, will throw off the mask as their plans become developed, and their influence for good or for evil will thereupon cease.

We have received a prospectus of one of the sanitary speculations, to which we have already referred, and we quote it as a characteristic specimen.

It is surmounted with two mottoes—"Dum vivimus vivamus," and "Omnia vincit amor;" and is called the North London Microscopical Analytical Sanitary Society, for ensuring to all classes of the community sound, wholesome, and unadulterated food of all solid kinds, as well as all kinds of fluids—such as milk, beer, wine, spirits, &c., consumed by the public; and, lastly, to remove all noisome and pestiferous nuisances of a local and general kind.

RULES.

1. A donation of ten guineas or more shall constitute a Life Governor.—2. An annual subscription of a guinea shall constitute a Governor as long as the subscription continues.—3. All subscriptions to be paid in advance for the current year.—4. The room and its appurtenances, set aside and given by the Founder, to be appropriated to the Society. He reserves the prerogative to close or shut-to the door against all and every querulously disposed disputant.—5. The working members shall assemble weekly or oftener, as may be considered necessary for the furtherance of all matters connected therewith.—6. Microscopes and their respective powers, analyses, and the like, as well as all books, journals, and all periodicals belonging to the Society shall not be taken from, but may be read in the Society's room, subject to rules regulating the time for perusal by each member.—7. The Founder imposes on himself (as far as can be attained) a perfect and just attention to, and adjustment of, all other matters which may be required for the interests and advancement of the Society.

We also have before us a similar prospectus of an association about to be established "for the purpose of supplying the public and the medical profession with unadulterated drugs and chemicals, invalids' food, condiments, sanitary and domestic articles, to prepare physicians' and other prescriptions, photographic chemicals," &c. This is followed by a few selected quotations from the parliamentary evidence on adulteration, coupled with the names of several of the enthusiastic witnesses, and an allusion, in appropriate language, to the almost universal adulteration of every description of food, condiment, drug, &c., and the very large dividend to be divided among the shareholders in the proposed speculation.

Schemes of this description afford a sufficient explanation of the motive for circulating exaggerated statements, and of the estimated *money value* of the panic thus raised in the public mind by the class of sanitary reformers whose policy we have exposed.

No further evidence is required as to the disinterestedness of these persons—that is to say, the sincerity of their desire to *serve* the public.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

PHYTOLOGICAL CLUB.

The Third General Annual Meeting was held on January 9th, 1856,

ROBERT BENTLEY, F.L.S., PRESIDENT, IN THE CHAIR.

Donations were announced by the Curators from Mr. Medley and Mr. Gissing, of Worcester.

Mr. Hanbury drew attention to the sub-spontaneous occurrence of several plants of the South of Europe, upon a piece of waste ground between Watney's Distillery and the Thames at Wandsworth. Mr. Hanbury exhibited specimens of *Melilotus parviflora*, *M. Messanensis*, *Trifolium resupinatum*, *Anthemis mixta*, and *Chrysanthemum coronarium*, gathered in this locality; and enumerated several other foreign species that had been found there. It was suggested that the seed of these plants had been imported with foreign corn.

The following Report of the Committee was then read:—

The Committee of Management of the Phytological Club, in presenting their Report for the third year of its existence, congratulate the Members on the steady progress which has been made during the past year.

Several new Members have been added, and valuable donations of plants have been received.

186 species have been added to the herbarium of reference, which now consists of more than 520 species. These have been arranged and mounted, under the superintendence of a sub-committee, and are placed in the cabinet belonging to the Club. They may be inspected by Members on application to the Curators. Above 2000 duplicate specimens remain for distribution amongst the Members.

The Committee would suggest, with the view of increasing the interest in the proceedings of the Phytological Club, that the Members should associate during the summer months, for the purpose of forming botanical excursions, and that due notice of such excursions should be given to the Members.

The Treasurer's report showed a balance in hand of £8 1*s.* 8*d.*

The Report having been unanimously adopted, the following Officers were elected for the ensuing year :—

President, Robert Bentley, F.L.S., Professor of Botany and Materia Medica; Vice-Presidents, Jacob Bell, F.L.S.; Henry Deane, F.L.S.; T. N. R. Morson, F.L.S.; T. Redwood, Ph.D., Professor of Chemistry and Pharmacy; P. Squire, M.R.I.; Treasurer, Daniel Hanbury, F.L.S.; Curators, Mr. J. C. Braithwaite and Mr. Wood; other Members of Committee, Mr. Greenish, Mr. Grundy, Mr. Prentis, Mr. Sharpe, Mr. Schweitzer, Mr. Tupholme; Lindsey Blyth, Hon. Secretary.

The meetings of the Club were appointed to take place on the second Wednesdays in February, March, April, May, November, and December, 1856, and the next Annual General Meeting on the second Wednesday in January, 1857. The arrangement and announcement of the Summer excursions were left to the Committee of Management.

The thanks of the Club were then voted to the Council of the Pharmaceutical Society for the use of their rooms, and to the Editor of the *Pharmaceutical Journal*, for the insertion of the reports of the meetings.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

Royal Institution, Thursday, 3rd January, 1856.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

Messrs. Tiernan and J. F. Smith were elected Members of the Association.

The Secretary announced the following Donations to the Museum :—From Messrs. John Bell and Co., London, through Dr. Edwards, sixty-three specimens of Drugs, &c., in glass jars; from G. F. Wilson, Esq., twenty-two specimens of the

Products of the Manufactures of Price's Patent Candle Company; from T. C. Archer, Esq., eight specimens of rare articles imported into Liverpool; from R. R. Jackson, Esq., two specimens of Manna.

Mr. MERCER delivered a lecture on the "Elementary Principles of Photography," which was illustrated by a large number of diagrams and experiments.

The thanks of the meeting were passed to the donors to the Museum, and to Mr. Mercer for his lecture.

Royal Institution, Thursday, 17th January, 1856.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

Mr. R. Parkinson was elected a Member of the Association.

The SECRETARY announced a valuable donation of 120 specimens of Drugs from H. Ward Jackson, Esq., through Mr. H. S. Evans.

The thanks of the meeting were given to Mr. Jackson for his contribution.

The CHAIRMAN read a letter he had received from Mr. Horsley, of Cheltenham, referring to a paper which had been read at a former meeting, by Mr. Dantec, on a process patented by him in 1852, for the use of baryta in purifying water for the prevention of incrustation in steam-boilers, and other purposes. Mr. Horsley stated that he had taken out a patent for the same thing in 1849, and was consequently the original inventor.

Mr. MERCER said he had seen the two patents; and though in some respects there was a similarity between them, they were not identical, and he thought them both valid. Mr. Horsley confined himself to the use of calcined or caustic baryta, while Mr. Dantec, in his specification, included besides caustic baryta, all its salts as well; and in practice, he believed, Mr. Dantec had found it more economical to use other compounds, in preference to the caustic baryta. At the same time he was quite sure, when Mr. Dantec took out his patent, he had not the slightest knowledge of the existence of Mr. Horsley's.

After some little discussion on the merits of the two patents, Mr. Newton Samuelson, F.C.S., delivered a lecture on "Lead." After describing the uses to which this metal was applied, he entered into a detailed description of the various processes for obtaining it from its ores, illustrating his remarks with well-executed diagrams of the furnaces, &c., employed. He also detailed the preparation and composition of the various oxides and salts of lead, entering fully into the manufacture of the white lead of commerce, and the means of detecting the various adulterations to which it is subject. The alloys of lead next engaged attention, and he concluded his interesting lecture by a sketch of the means adopted for estimating the value of lead ores, by the humid as well as the dry assay.

The following paper was read by Mr. G. R. BERRY on

PHOTOGRAPHY APPLIED TO PHARMACY.

In bringing the subject forward this evening, I shall merely produce a few specimens to illustrate the statements I am about to make, hoping that many others of our number may be induced to take up this, in my mind, important pursuit.

The particular branch of the subject I have selected for the present occasion is Photo-micography.

We have all of us seen the beautiful, and, on the whole, truthful drawings by means of the camera lucida of microscopic objects, in the work recently published by Dr. Hassall. What a large amount of time and labour must have been employed to fill in the almost infinite detail there represented! But if we take the lens as our artist, the collodion plate as the recipient of our labours (in lieu of the steel or copper one of the engraver), and light, solar or artificial, to impress the image to be elaborated by the developing agent—we are able, without much difficulty, to reproduce with absolute fidelity, and with any amount of increased dimensions, the wondrous spectra of the microscope.

The advantages to be derived by photographic representation are very many. Take, as an example, two specimens of raw cotton, and examine them one after another by the ordinary microscope. We see represented a number of fibres, tortuous and involved, and it would require a very skilful microscopist to perceive any difference between them; but if we photograph them, you have the power of minute and deliberate comparison, and you see by the accompanying specimens that the Sea Island cotton (the more valuable) has long, slender, and compact fibres, while

the Mobile specimen is coarser and looser in structure and much shorter in the fibre.

We will now consider the process as a means of detecting and recording adulteration or admixture.

One of the photographs before the meeting is taken from a sample of lint offered to me as linen lint; you will at once perceive that cotton fibres are almost as numerous as the transversely-jointed tubes of the flax. I have yet to learn that cotton and flax are indifferently used in the manufacture of linen fabrics.

Again, I produce a print of quinæ disulph. (Howard's) and another of salicine, a substance rather notoriously used for its sophistication. The difference in form and size is very remarkable, and I have detected salicine even in extremely small quantities by this means.

A very interesting and important series would be the various starches. I have only three specimens, and these are by no means satisfactory, owing to the limited powers of my present instrument; but I hope yet to lay before you the various amylaceous bodies, with their details perfect, and on such an enlarged scale that the larger globules in wheat starch shall not be less than three-quarters of an inch in diameter.

In conclusion I may state that the cottons, lint, quinine, and salicine, were all taken upon the same slip of glass and without alteration of focus, so that their different dimensions can be accurately compared by measurement. The starches were under a much higher power, subjected to the same treatment.

Mr. Berry exhibited to the meeting his apparatus, and having prepared a plate, produced a photograph and developed it. He uses the ordinary collodion process, developes with pyrogallic acid, and employs as the source of illumination the oxyhydrogen lime light. He also presented the Society with ten positive photographs of lint, quinine, salicine, &c.

The thanks of the meeting were voted to Messrs. Samuelson and Berry for their instructive and valuable communications.

ORIGINAL AND EXTRACTED ARTICLES.

NOTES ON THE MATERIA MEDICA OF THE PARIS UNIVERSAL EXHIBITION, 1855.

(*Continued from page* 335.)

Cuapinoli, resin of *Hymenæa Courbaril.*

Copal blanco, two specimens. This resin has occasionally appeared in English commerce under the name of *Mexican* or *Vera Cruz Elemi.* It is the *Tacamaque jaune huileuse*, B. of M. Guibourt's *Histoire des Drogues* (t. iii. p. 484); we believe it to be the produce of the *Elaphrium elemiferum* of Royle.*

Résine de Liquidambar, *Liquidambar styraciflua*, two specimens; one is pale yellowish brown and nearly transparent (is it obtained by incision of the trunk?), the other grey and opaque (procured by boiling the young branches in water?). Department of Vera Cruz.

Sarsaparilla Root.—Vera Cruz.

Contra Yerba; the root so labelled consists of tubers as thick as the little finger. Perhaps it is the produce of *Psoralea pentaphylla* L. (*Leguminosæ*) described by some authors as *Contrayerva nova v. alba* or *Mexican Contrayerva Root.*

Madder Root.

Racine de Camotillo,—a yellow powder.

Pipitzahoac Root; accordiug to the catalogue the produce of *Eupatorium sessilifolium*, but we believe more correctly referable to some species of *Trixis.* It is a drastic purgative.

Riolozic Acid, a brilliant, golden-yellow substance extracted from the Pipitzahoac root by M. Rio de la Loza. The process by which it is prepared is detailed

* *Manual of Mat. Med. and Therap.* Ed. 2. 1853. P. 390.

in an appendix to the catalogue; the subject has also been investigated in Germany, as will be seen by a short notice in the present number.

Jalap, Ginger, Indigo, Capsicums, Vanilla, and several medicinal herbs.

Guatemala.—There are a few specimens of drugs from this country, most of them unknown in European commerce. The native or Spanish names alone are attached to the specimens.

We have noted among others the following:

Estoraque de Balsamo (2 samples), a pale yellowish brown bark in coarse fragments, having an agreeable smell like *Styrax Calamita*.

Copal, an odorous resin,—*Icica* sp.?

Sangre de Drago, a red resin in small masses, produce of a *Croton?*

Guaco, a small root, somewhat like *Senega*.

Racine de Sintule, aromatic,—*Cyperus?*

Piment, espèce dite Cordoncillo, *Piper* sp.?

Piment de Vera Paz.

Quinquina de Escuintla.

Quinquina de Chiquimula.

Mapaguite, small oleaginous orange-coloured fruit.

Suvin, black legumes about 3 inches long, used in dyeing.

Thé fébrifuge.

Suif végétal, vegetable tallow.

New Granada—has contributed a few specimens of Materia Medica, among which are the following Cinchona Barks:

Quinquina du Peñon de Pitayo.

Quinquina de Pandi, Nouvelle Grenade.

Quinquina de Fusagasuga, Nouvelle Grenade.

These specimens all referrible to the *Quinquina orangé de Mutis* of Guibourt's *Histoire des Drogues*, the produce of *Cinchona lancifolia* of Mutis, *Cinchona Condaminea* var. δ *lancifolia* of Weddell.

Quinquina de Pitayo, is correctly so labelled.

British Guiana—has responded with great spirit to the invitation to contribute to the Great Exhibition of 1855, the result being a very creditable display of the productions of the colony, illustrated by a copious, informing and well-arranged catalogue, published in both French and English.* The catalogue is prefaced by some valuable remarks upon the resources of Guiana, its climate, soil and population.

Reverting to the subject of Materia Medica, we may mention the following:

Class C. No. 31. Resin of Conima or the Hyawa-tree,† *Icic heptaphylla* Aubl.—from T. B. Duggin.

7. Balsam Copaiba (T. B. Duggin), a sample obtained from the Macusi Indians. There are several trees in the colony supposed to yield Copaiba, but they are not yet botanically determined. We should like to know if this Copaiba is exported.

18, 19, 20. Resin of the *Simeri* or Locust-tree, *Hymenæa Courbaril* L., a hard copal-like substance obtainable in great abundance in various parts of the colony, but apparently not yet an article of much trade. Specimens from the Guiana Executive Committee and T. B. Duggin.

Class F. 19. Seeds of the *Arara* or Pump-wood *Unona*, sp.?—Guiana Executive Committee. The warm decoction of these seeds, when they are ground to powder, is highly prized by the Indians as an astringent.

Class A. 41. Black Pepper, *Piper nigrum* L., from Berbice River, T. B. Duggin.—One vine yielded the contributor in one season a crop of 10 lbs. weight.

---

* The edition of the Catalogue we have quoted is that printed at Georgetown, Demerara, for the Guiana Executive Committee.

† For some account of its use, see Hancock in *Trans. of the Med. Bot. Society*, 1834-1837, p. 159.

Class C. 39. Cowitch, pods of *Mucuna pruriens* De C.—T. B. Duggin.

32. Seeds of the Greenheart, Bibiru or Sipiri-tree, *Nectandra Rodiœi* Schomb., from R. J. Knowles, Georgetown.

34. Greenheart Bark and

35. Sulphate of Bibirine, both from R. J. Knowles.

37. Grains of Paradise, seeds of *Amomum Melegueta* Rosc.—R. J. Knowles, Georgetown. (Vide *Ph. J.* vi. 412.)

53. Citrate of Lime and

54. Citric Acid, contributed by J. R. Knowles, Georgetown. These products obtained from the fruit of *Citrus Lima* Macf. might be manufactured in large quantities, the tree growing almost spontaneously throughout the colony and the fruit being extremely abundant.

The collection also includes a very large number of barks, of many of which the botanical origin and economic uses have yet to be discovered. Some of them would doubtless repay chemical investigation.

We subjoin the names taken from the catalogue, thinking that the list, alphabetically arranged, may be useful for future reference. Specimens have been contributed by the Guiana Executive Committee and by Messrs. Duggin, Rodie, Ross, &c.

Class C. 75. Acouribroed Bark, see *Marsiballi.*

87. Arrara, Tryssil or Trysle Bark, may be used for tanning; is used as an emetic and a fish poison by the Indians.

85. Arumata Bark, may be used for tanning. The wood of the tree is hard and strong, excellent for planking vessels, but is chiefly used for the rafters of cottages. The heart-wood is pretty and might be used for furniture.

98. Baracara Bark, *Erythrina Corallodendron* L., properties not stated. The tree affords a hard, close and even-grained wood. Its red seeds are used for necklaces, bracelets and other ornamental purposes.

73, 74. Baramalli or Pump-wood Bark from Berbice and Pomeroon Rivers. A tanning bark.

99. Barerua or Barrowa Bark from Demerary River.

64. Bastard Bully-tree, see *Turaniŕa.*

60. Bastard Silverballi, see *Cretti.*

34. Bibiru, see *Greenheart.*

95. Black Silverballi Bark,—properties not stated.

97. Blood-wood Bark, see *Urali.*

65. Cabacalli Bark; the decoction is said to be an excellent dressing for sores. The tree grows tall and straight and will square from 12 to 18 inches for 40 or 50 feet in length. The wood is heavy and close-grained and, for boat-building, is considered very little inferior to Silverballi, as, like that wood, it possesses a bitter principle, which protects it against the attacks of worms and renders it durable under water. It must, however, be fastened with copper nails. Of the branches, timbers and knees for every description of craft are made, which are quite as lasting as those of Mora-wood.

69. Carapa or Crab-wood Bark, *Xylocarpus Carapa* Spr.; *Carapa Guianensis* Aubl. Demerary River. A tanning bark. The wood of the tree is light and, as it takes a high polish, makes excellent furniture. It is also much used for floors, partitions and doors in the houses of the wealthy. Masts and spars are formed of it, and it is sometimes employed for sugar hogsheads, or even for shingles, as it splits freely and smoothly.

The seeds yield *Crab Oil*, used in the colony for burning, also esteemed as an oil for the hair.

59. Cowechi or Queiche Bark, said to be a valuable remedy in dysentery. The inner bark is to be scraped and mixed with cold water, until the water becomes quite slimy. One small tumblerful should be taken three times a day.

63. Cow-tree, see *Hya-hya.*

69. Crab-wood, see *Carapa.*

60. Cretti, or Bastard Silverballi Bark. Esteemed by the Indians as a remedy for cramp in the stomach. One tumblerful of a decoction of the inner bark is a dose.

84. Curahuri or Kuruhuru Bark,—may be used for tanning. A warm decoction is used as a lotion for foul ulcers; also as an emetic. The tree grows tall and straight, is of large size and plentiful. The timber from its durability and from it not being liable to split, is valuable for the purposes of ship-building, also for mill timbers and planks of every description. The Indians make corials of it which are very durable.

92. Curaki or Kurakai Bark. The tree grows to an enormous size and yields a resin similar in properties to that of the *Hyawa* or Incense tree, *Icica heptaphylla* Aubl. The wood is described as the most suitable in the colony for deals, to be proof against dry rot and, when not exposed to the weather, exceedingly durable. It is light, open-grained and highly odorous, and is much used for corials and canoes. It is very plentiful in all parts of the colony in low swampy places. The uses of the bark are not mentioned.

90. Cuyama Bark, may be used for tanning.

62. Darena Bark. A decoction of this bark is used as an emetic.

91. Duca Bark,—properties not stated.

96. Futa or Pump-wood* Bark,—properties not stated.

34. Greenheart Bark, Bark of the Sipiri or Bibiru Tree, *Nectandra Rodiæi* Schomb. From the bark or the seeds the well-known alkaloid Bibirine is extracted. Greenheart wood varies remarkably in colour, as the following remarks by Mr. Buchanan, the contributor of some specimens, will show:

"Of the wood named *Bibiru* by the Arawaak and Warrau, and *Sipiri* by the Caribi Indians, there are two varieties, the black and the yellow. The really unmixed black is scarce; the yellow is more common, but the mixture of the two is most frequently met with, scarcely any yellow being free from a few streaks of black. The nearer, however, the wood is to the black variety, the better it is in every quality."

For ship-building and many other purposes, Greenheart ranks among the most valuable of timbers.

80. Haiawaballi or Hyawaballi Bark, *Omphalobium Lambertii* De C. This tree is not plentiful. Its timber, known as *Zebra-wood*, is in great request for furniture on account of its beauty, and is easily worked. The tree is of large size, but the heart-wood seldom squares more than 10 or 12 inches. The bark may be used for tanning.

This is quite a different thing from the *Haiowa-bally* of Hancock, a small compositous plant.†

66. Hiariballi Bark. A decoction of this bark is reputed an excellent dressing for sores.

70. Hog-plum Bark, *Spondias lutea* L., from plantation *Ruimveld*, contributed by G. Ross. Bark used for tanning; also as an astringent.

83. Hurahee Bark, may be used for tanning.

68. Huruwassa Bark, see *Soap-wood*.

63. Hya-hya, Milk-tree, or Cow-tree Bark, *Tabernæmontana utilis* Arn. The decoction is used as a lotion for the "Caribisi Sick," a malignant ulceration of the rectum, peculiar to the Indians. A specimen of the Milk of the Cow-tree (No. 11) has been sent by Mr. G. Dennis.

80. Hyawaballi Bark, see *Haiawaballi*.

67. Iturissi or Iturewici Bark. Its decoction is said to be a powerful emetic.

76, 77, 78. Kakaralli Bark, *Lecythis Ollaria* L. Bark may be used for tanning. The wood, which is abundant, is heavy, hard and close-grained, and more durable than Greenheart in salt water, from its property of resisting the

---

* This name is also given to *Baramalli Bark*.

† *Trans. of the Med. Bot. Soc.* 1834-1837. P. 102.

depredations of the sea-worm and barnacle. On this account it is much employed in the construction of wharfs, sluices, &c. It is also used for house frames. The bark is easily stripped off and consists of numerous layers, which the Indians separate by beating with a stick; Schomburgk has counted as many as 70 of these layers in a single strip. When separated they have the appearance of thin satin paper. They are dried in the sun and used as wrappers for cigars.

86. Kiraballi or Kuraballi Bark,—may be used in tanning. The warm decoction is applied to sores.

89. Konaballi Bark,—may be used for tanning.

81. Kulaballi Bark,—may be used as the preceding.

86. Kuraballi Bark, see *Kiraballi.*

92. Kurakai Bark, see *Curaki.*

84. Kuruhuru Bark, see *Curahuri.*

93. Mahoe, Mohoe or Yabo Bark, *Thespesia populnea* Cor., or *Hibiscus elatus* Sw. ?—This bark yields the Mahoe fibre.

71. Mangrove Bark, *Rhizophora Mangle* L.—This tree yields a chocolate-coloured dye, one of the colours introduced by Dr. Bancroft, and for the exclusive use of which he obtained an Act of Parliament.

75. Marsiballi or Acouribroed Bark,—may be used for tanning.

63. Milk-tree Bark, see *Hya-hya.*

93. Mohoe Bark, see *Mahoe.*

72. Mora Bark, *Mora excelsa* Benth., useful for tanning. The healing powers of a warm decoction applied to ulcers, are said to be surprising. The seeds of the tree contain starch, and are used by the Indians as food in times of scarcity.

The Mora is the most majestic tree of the forests of Guiana, towering above every other and often attaining a height of from 100 to 150 feet. Its wood is extremely tough, close and cross-grained, so that it is difficult to split, which renders it peculiarly adapted for ship-building. In fact Mora timber, as well as that of the Greenheart, ranks at Lloyd's as one of the *eight* first-class woods for ship-building.

94. Pacuri Bark,—like the bark of the *Hya-hya*, it is used as a lotion for the "Carabisi Sick." The bark of the White Cedar or Warracoori, *Icica altissima* Aubl., is also employed for the same purpose.

73. Pump-wood, see *Baramalli* and *Futa.*

59. Queiche Bark, see *Cowechi.*

82. Red Mora Bark,—may be used for tanning.

61. Sarabadani Bark. A decoction of this bark is said to make an excellent dressing for foul ulcers. The wood of the tree is dark purple, hard and close-grained, much in request for furniture.

51. Sea-side-Grape Bark, *Coccoloba uvifera* L., excessively astringent.

49, 50, 56, 57. Simaruba Bark, *Simaruba officinalis* De C., *S. Amara* Aubl.

The tree grows on hill-sides, to the height of 50 feet, branching and somewhat crooked; its wood resembles White Pine in colour and quality. It is light and easily worked, and may be had in boards 20 to 40 feet long and from 24 to 30 inches wide. It is much employed for partitions and other inside work of houses, but will not bear exposure to the weather.

34. Sipiri Bark, see *Greenheart.*

79. Siruaballi Bark, see *White Silverballi.*

68. Soap-wood Bark or Huruwassa Bark, *Sapindus* [*Saponaria* L. Both the root and bark are employed by the Indians as a substitute for soap. The bark is also used as an emetic.

64. Towraneroo Bark, see *Turanira.*

87. Tryssil or Trysle Bark, see *Arrara.*

64. Turanira, Towraneroo or Bastard Bully-tree Bark. Decoction considered diaphoretic, also used outwardly as that of the Hya-hya Bark. The tree is very abundant, growing to a large size; its fruit delicious; its timber a hard even-

grained wood, of a cedar-brown colour, used for framing-timber, spokes, &c. It is not durable when exposed to the weather.

58. Ubudi or Wild Cashew Bark, a powerful astringent. Surprising effects are ascribed to warm applications of the decoction in the cure of sores. The tree bears only once in four or five years (?), and is rarely cut down by the Indians. The fruit is very like that of the cultivated Cashew, but smaller, and is either of a pale yellow or deep puce colour and of an agreeable acid.

97. Urali or Blood-wood Bark. The juice of the young branches is said to be used by the Indians to remove films from the eye.

88. Wallaba Bark, *Eperua falcata* Aubl., useful for tanning. A tree abundant throughout the colony, growing generally on the banks of rivers. Its wood is of a deep red colour, hard and heavy, but it splits freely and smoothly and is much used for shingles, staves, palings, posts, house-frames, &c. It is impregnated with a resinous oil which makes it very durable both in and out of water. The resin that exudes from the tree is used for fresh cuts or wounds.

79. White Silverballi or Siruaballi Bark, *Nectandra* or *Oreodaphne* sp. ?, may be used for tanning. There are four varieties or species of this tree, distinguished as *black*, *brown*, *yellow*, and *white* Silverballi, possessing the same properties, but the white is least esteemed. The wood is used for the outside planking of vessels and boats.

58. Wild Cashew Bark, see *Ubudi*.

93. Yaho Bark, see *Mahoe*.

French Guiana or Cayenne.—A few interesting specimens from this colony have been sent to the Exhibition. The following may be mentioned:

Gomme Acajou, *Anacardium occidentale* L., a fine specimen, also the same in a prepared state, called *Colle d'Acajou*.

Gomme Courbari, *Hymenæa Courœbaril*, a copal-like resin, common also in British Guiana.

Balsam Capivi.

Fat extracted by boiling the seeds of *Virola sebifera* Aubl., nat. ord. *Myristicaceæ*.

Ayapana Leaves.

Bark of *Lecythis Zabucajo* Aubl.

Bark of *Rhizophora Mangle* L. (*Palétuvier*), astringent.

Cinnamon Bark, marked 10 francs per kilogramme, equal to 3*s*. 10*d*. per lb.

Racine de Balisier, *Alpinia nutans*, an aromatic rhizome, resembling *Galangal*.

Vanilla, Tonka Beans, Black Pepper and Cloves.

Passing from Guiana we may briefly notice a collection of raw produce numbering some seventy specimens, obtained during an exploration of the River Amazon. Generally, only the native names are given (and these, we suspect, have in many instances been misplaced), added to which there is some indication of the uses to which the substances are severally applied. Among the drugs recognizable, may be named Sarsaparilla, *Abutua* a root somewhat resembling *Pareira Brava* but yellow, Simaruba Bark, Brazilian Clove Bark (*Dicypellium caryophyllatum* Nees), Casca pretiosa (*Mespilodaphne pretiosa* Nees), Coca Leaves (*Erythroxylon Coca* Lam.), Sassafras Nuts, Vanilla, Tonka Beans, Guarana Paste (*Paullinia Sorbilis* Mart.), some barks of *Cinchona* and *Cascarilla*, &c.

Brazil.—The vast empire of Brazil, a territory nearly equal in extent to the continent of Europe, has in all but five contributors to the Paris Exhibition. Of these we need mention but one, namely, M. Auguste Maulaz, who has sent Tea grown on his plantation in the province of Rio Janeiro.

Paraguay.—Some copious and good specimens of drugs, used either in medicine or for tanning or dyeing, have been contributed by this republic; but the native names alone being given, and none but the briefest mention made of their uses, it is hardly possible (in the absence also of a catalogue) to convey to our readers any instruction derived from the inspection we have made.

A sample of *Maté*, the well-known Paraguay Tea produced by *Ilex Paraguariensis* St. Hil., remarkable for containing Caffeine, has been sent; there are also specimens of Senna Leaves, Sarsaparilla and China root, but they offer no resemblance to the drugs used in Europe under these names.

Africa—has contributed but few specimens of raw drugs to the Exhibition. Our own colonies on the West Coast have in fact sent nothing, a circumstance but little creditable to the public spirit of our merchants resident in that country or trading with it from the mother-country.

Cape Colony and Natal are reported in the catalogue to have furnished a few specimens of Materia Medica, but we must confess they escaped our notice.

Of the French possessions in Africa, Algeria has contributed a most instructive and interesting display, which, although not including many objects of Materia Medica, is rich in important and valuable products of the vegetable kingdom. The collection is well illustrated by an explanatory catalogue of 200 pages published by direction of the Government,* as a guide to the *Exposition Permanente de l'Algérie*, an exhibition of Algerian produce opened since the year 1851. The last section gives a list of the contributions to the Universal Exposition of the present year.

We shall make no apology for quoting from this little work, which is replete with useful and interesting information, and which not only points out what *has been* produced in the colony, but suggests new objects to which attention may be profitably directed.

The collection of Opium, several samples of which have been contributed, was commenced as an experiment in the Central Nursery Garden of Algiers in 1844. The experiment proved successful, and measures were taken for encouraging the cultivation of the poppy on a larger scale, the state agreeing to purchase the opium produced, at the rate of 50 fr. per *kilogramme* (18*s.* 4*d.* per lb.). Developed by so strong a stimulus, several *hectares*† of land were under poppy cultivation in 1851, when the crop proving generally very abundant, a mean yield of 20 *kilogr.* per *hectare* was obtained (equal to 17 lb. 13 oz. per acre).

Samples of the opium have been submitted to the Imperial Academy of Medicine, which commissioned MM. Chevallier, Grisolle and Bouchardat to examine and report upon the drug. These gentlemen pronounced favourably, asserting that the opium of Algeria was comparable to the best varieties of Smyrna, and that it had yielded upon analysis from 7 to 11.33 per cent. of morphia, the average, taking five samples, being 9.46 per cent.

We learn further, that a *hectare* of land cultivated with the poppy, produces (ordinarily) from 20 to 23 *kilogrammes* of opium, from 10 to 12 *hectolitres* of seed, and from 600 to 700 bundles of stalks which may be used either in thatching stacks or for manure. The value of the produce may be estimated thus :

23 kilogr. opium, at 30 fr. per kilogr. (ordinary price)	690 fr.
11 hectol. poppy seed, at 22 fr. per hect.	242 "
700 bundles of stalks, at 10 fr. per hundred.....	70 "
Total.....	1002 fr.

Interesting contributions of another class, are Essential Oils, a prize for which was awarded to M. Mercurin at the Great Exhibition of 1851. In the Permanent Algerian Collection there are samples (No. 472) of Essence of Geranium, Lemon, Cedrat, Bergamot, Orange Peel, Marjoram and Wormwood from M. Simounet, Pharmacien, Algiers; (No. 476) Essence of Neroli and Portugal, Essence of Jessamine *leaves* (according to the catalogue), Essence of Melarose, a sort of lemon, Essence of Petit-grain, Myrtle, Rose, &c. from M. Mercurin of

* *Catalogue explicatif et raisonné de l'Exposition Permanente des Produits de l'Algérie* (*Rue de Grenelle St. Germain*, 107) *suivi du Catalogue méthodique des Produits Algériens à l'Exposition Universelle de Paris en* 1855. Paris 1855. 8vo.

† A *hectare* equals 2·471 English acres.

Chéragas; Essence of Anise (No. 480) and of Peppermint (No. 482) from M. Nielli of Philippeville.

The Essence of Geranium is stated to be distilled from the leaves of *Pelargonium roseum* Ait. and *P. odoratissimum* Ait., plants which thrive with astonishing vigour in Algeria, and which, though but recently introduced, are now cultivated by the acre at Hussein-Dey, Kouba and Birmandreis. The Essence of Geranium has great analogy with Otto of Rose: from 50 to 60 grammes (771 to 925 grains) are obtained from 100 *kilogr.* (220 lbs.) of leaves not deprived of petiole and herbaceous stem.*

Among the drugs from Senegal and Gaboon, the other French colonial possessions in Africa, but little calls for remark. Copal and Wax from Gaboon, Palm Oil, a sample of coarse Indigo, some very soft Caoutchouc, Ground Nuts, Grains of Paradise, and very fine Gum Senegal are in the collection.

In here closing our remarks upon the specimens of Materia Medica displayed in the Paris Universal Exhibition, we must acknowledge our full sense of the imperfect manner in which our task has been performed. Apart from the magnitude of the collection and the large space over which it is scattered, there are practical difficulties in satisfactorily examining the properties of drugs in a crowded public building, even when permission to handle has been obtained.

A report upon one not unimportant collection, that from Turkey, which we have passed over in silence, will, we trust, be undertaken by abler hands, a considerable portion of it having been presented by the exhibitor † to the Ecole de Pharmacie of Paris.

As to the raw Materia Medica from other European countries, it is so small in amount and so eclipsed in interest by the manufacturing products of the laboratory, that we have not thought it needful to devote more space to its description than that occupied by a few remarks under the head of *Chemicals*.

In taking a general review of the medicinal substances included under the head of *Products obtained without Cultivation*, one cannot but be struck with the fact that, rich as the collection is, many important drugs are wanting, not having been contributed by the countries producing them.

Thus, of Sarsaparilla, Ipecacuanha, Copaiba and Balsam of Tolu, articles constantly imported into Europe, there is no series of specimens; nor are the Cinchona Barks of Bolivia, Peru and Ecuador represented on the part of those countries, as they undoubtedly might have been. This deficiency, we think, is in some cases attributable to the fact of a drug being produced only in one district, and to the improbability of increased publicity affording any substantial benefit to the few parties interested in the traffic. In other cases, the trouble, or expense or risk, highly magnified, no doubt, by the apathy and inertia so commonly produced on Europeans by a hot climate, have had their influence in deterring the contribution of articles of so little general interest as drugs.

With regard to new articles of Materia Medica, there is always considerable difficulty in procuring for them a fair trial, a circumstance not to be wondered at, when we reflect on the multitude of substances already at our disposal, fulfilling to a certain extent almost every indication required: and further, that the end and object of administering a drug, is the production of a certain important result, the attainment of which might be hazarded by the use of a doubtful or untried medicine.

Much, nevertheless, is being done. In large cities, there is ample opportunity at the disposal of the physician, for investigating the therapeutical properties of proposed remedies, without at all compromising the interests of the patient. New drugs are constantly being introduced, while others, once esteemed, fall into disuse, often less from their own demerits than from the prevalence of

---

* Vide *Ph. Journ.*, vol. xi., p. 325.

† M. F. Della Sudda, Pharmacien to the Sultan.

fashion, or from their properties being represented in other and perhaps more easily obtainable substances. To discriminate the qualities of each and to make a scientific and enlightened use of those most adapted to relieve the sufferings of mankind, will be the aim of the intelligent practitioner of medicine; and how wide the field for such researches still is, the vast collection displayed in the Paris Exhibition affords ample evidence.

ON THE NUTRITIVE PROPERTIES OF THE MASS WHICH REMAINS AFTER THE EXPRESSION OF THE NUTS OF THE COCOA, &c.

BY W. HAMILTON, M.B.

The interesting account given by Mr. Archer in his valuable lecture on the "Useful Products of the Natural Order Palmaceæ," to the members of the "Liverpool Chemists' Association," on the 8th of last November, and inserted in the *Pharmaceutical Journal* for the present month, has recalled to my recollection a circumstance which may not be unimportant at a time when the high price of food presses with such overwhelming weight upon most classes of the community.

Mr. Archer, speaking of Price's Patent Candle Company, observes that it is "making an enormous amount of goods for the island of Ceylon, where they have large plantations of the cocoa nut palm, the produce of which is enormous. An acre will yield about 4000 nuts per annum, if well cultivated." After describing the manner in which the oil is obtained, he adds, that "the marc, or oil cake, is valuable as food for cattle."

Having been resident in the West Indies during the last American war, when the greatest distress was produced by the stoppage of the usual supply of provisions from the Northern States, and wheaten flour was in consequence scarce and dear, among other contrivances for increasing the supply of bread, was an admixture of this marc, which Mr. Archer represents as so valuable as food for cattle, with wheaten flour, in the proportion, if I recollect aright, of one-third or more of the marc—the bread made from which was not only light and agreeable to the taste, but eminently wholesome and nutritious.

Were Messrs. Price and Co. to add a series of experiments on this subject to their other important operations in the manufacture of oil and candles from this valuable palm, they might, while adding materially to their own industrial resources, contribute a large addition to the food of man, and thus mitigate much of the distress resulting from high prices. Much oil is likewise obtained from the *Arachis hypogœa* and other substances, the marc of which likewise admits of application to human sustenance, and therefore merits the attention of the philanthropist no less than that of the political economist.

These remarks may perhaps be considered as misplaced in the pages of a work devoted to Pharmaceutical subjects; but as food is the raw material out of which both life and health have to be elaborated, nothing which concerns the one can be regarded as wholly indifferent to the other.

ON VEGETABLE EXTRACTS.

BY MR. THOMAS SOUTHALL.

Some digressive remarks on vegetable extracts and their treatment by alcohol, in the paper upon Sugar, read by W. Roberton before the Pharmaceutical Society of Manchester, have struck my attention; and I am induced to add a few words in confirmation of the wish expressed by him that the subject may claim the attention of the Pharmacopœia Committee.

My views of the character of vegetable green extracts are much in unison with those expressed by W. Roberton, and I believe the well-dried plant is in many

instances more efficient than the inspissated juice, and free from objections which generally attach to the latter preparations.

The particular subject, however, I now wish to call your attention to is the use of an alcoholic extract in the preparation of Belladonna Plaster, which we make as follows:—

The portion of extract of belladonna required to make a certain amount of plaster is mixed with as much water (with *heat*, if necessary) as will make it of the consistence of treacle. To this, small portions of spirit are gradually added. A considerable quantity may be introduced without destroying the homogeneousness of the mixture, but, after a certain amount, the mucilaginous part of the extract begins to separate, and on the addition of more spirit, becomes so completely distinct that it may be strained out through calico by strong expression. I would recommend any person trying this formula not to stint the quantity of spirit, which can be recovered by distillation.

The clear tincture being obtained, the spirit distilled off, and any excess of watery portion evaporated, the residual extract is to be added to the melted plaster, and the compound, *when* of proper consistence, formed into rolls.

A plaster thus made is, I believe, more efficacious than the common kind, both because the produce is less and it adheres more firmly to the skin, while it is much more manageable for spreading.

USE OF METHYLATED SPIRIT.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—From some observations made by Mr. Macfarlan, in his paper on Methylated Spirit, published in the last number of the Journal, the purport of Mr. Woolley's letter to the Chairman of the Board of Inland Revenue, respecting the manufacture of ethers, &c., from finish, appears to have been misunderstood.

Mr. Woolley and the other Members of the Association were not then aware that the use of methylated spirit in the manufacture of these substances was permitted by the law; and Mr. W. had made some experiments, to ascertain how far it was practicable to prepare them from finish, and finding the products nearly as good as when made from pure spirit of wine, wrote to the Board of Inland Revenue, stating the results of his experiments, and asking if the use of finish in the manufacture of ethers, &c., would be permitted by the law; but made no allusion whatever to the *recovery of the spirit* in its original state from the finish. The Board, in their reply, did *not* decide the question asked, but *did* decide a question that was not asked.

It is not supposed that any one uses finish for these purposes who is able to procure methylated spirit. But very few of the retail Chemists are able to procure it, and it is a question of some importance to them to know whether they are infringing the law by using finish in making on a small scale those preparations which the wholesale manufacturer is allowed to make extensively, with the additional advantage of having the methylated spirit free from any admixture of lac.

I am, Sir, yours truly,

W. Wilkinson,

Manchester, Jan. 14*th*, 1856. *Hon. Sec. to the Manchester Pharm. Association.*

LARGE DOSE OF ANTIMONY.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—I think the following case may be of interest at the present time, and, if you are of the same opinion, will thank you to insert it in your Journal:—

About twenty years ago a liniment, composed of Antim. Tart. ℈j., and Lin. Sapon. ℥j., was ordered for a consumptive patient, and at the same time an ounce draught of rhubarb and ipecacuanha. Both were labelled properly: "The liniment to be used night and morning, as directed," and "The draught to be taken in the morning." The nurse, by mistake, gave the liniment in lieu of the draught, and instantly discovering her mistake, immediately ran to the physician in a frantic state, stating what she had done. He directed her to give copious draughts of warm water, which she did, and the patient was in a few hours much in the same state as he was a few days previous. I am, Sir, yours, &c.,

Collingwood Street, Newcastle, January 18, 1856. William Procter.

ON THE EMPLOYMENT OF HYDRATE OF BARYTA IN SOFTENING CALCAREOUS AND OTHER WATERS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In the January number of the Journal, I notice the report of a paper, read at Liverpool, by Mr. Dantec, "On a Process for purifying Water for preventing Incrustation in Steam Boilers, and other purposes," for the use of which process Mr. Dantec has secured a patent.

In 1846 I employed hydrate of baryta in softening the water used by the Paris and Rouen Railway Company at Batignolles station, near Paris (20,000 gallons per diem)—water containing nearly 100 grains of sulphate of lime per gallon; and in my French patent I included the use of hydrate of baryta and other reagents.

In 1847 I commenced taking out a patent in England, but after having paid about £15, I declined proceeding further.

In 1849, Mr. Horsley, Chemist, of Ryde, Isle of Wight, patented the application of the hydrates of baryta and strontia to softening water and preventing boiler incrustations. I had several interviews with Mr. Horsley on the subject, and pointed out to him many difficulties which would inevitably arise in the practical application of the process on a commercial scale—difficulties the consideration of which had induced me to forego proceeding with my English patent in 1847. I believe that Mr. Horsley's patent has been entirely unproductive.

The efficiency of hydrate of baryta in softening water containing sulphates and carbonates of lime and magnesia, cannot be called in question. The great objection to its use arises from the facts that this reagent is a poison, and that water obtained from one and the same source differs in the amount of its earthy constituents at various seasons of the year. If hydrate of baryta be employed for softening water, its use must be committed to the charge of persons superior to our ordinary firemen and stokers, and no outlet allowed from the reservoir containing the softened water, except direct into the boiler.

Yours faithfully,

Leeds, January 15, 1856. E. H. Durden.

ON THE PROCESS FOR OBTAINING OXYGEN.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Having occasion some short time since to prepare some oxygen gas for chemical experiments, I adopted the mode recommended by Professor Fownes in his *Manual of Chemistry*—viz., a mixture of KO, Cl O_5 and Mn O_2 (in the proportions of three parts of the former to one of the latter), as being the readiest and most economical way. Instead, however, of finding such to be the case, I was greatly perplexed by almost an entire failure, even after repeated attempts to realise my object.

I pursued this plan *literatim*, and found that the first quantity of gas came over tolerably pure; but, in a few seconds afterwards, and all on a sudden, large volumes of dense vapour, having the physical characteristics of "chlorine," combining an odour somewhat peculiar, passed over with it. In addition to the aforesaid change, there is another of a still more peculiar nature, which has doubtless been noticed by most experimenters—viz., a brilliant sparkling which takes place as soon as oxygen gas begins to pass over, and continues at intervals during the process; as soon, however, as the impurities before mentioned begin to contaminate it, a sort of combustion takes place, and gas ceases to be evolved.

From the way in which this process is mentioned by Fownes, the student of chemistry is quite unprepared for the change which takes place, for he (Fownes) says (p. 97)—"All the oxygen comes from the chlorate, the manganese remaining quite unaltered." And further—"This experiment affords an instance of an effect by no means rare, in which a body seems to act by its mere presence, without taking any obvious part in the change brought about."

One can hardly dispute the opinion of such a high authority, still I am inclined to think that there is more than an ordinary amount of ambiguity about it; and the question arises, Are there no means of accounting for these peculiar phenomena?

and is the statement that a body acts by its mere presence either conclusive or satisfactory?

It was at one time a matter of question in my own mind as to whether the sparkling appearance was due to "ignition;" this, however, cannot, I conceive, be the case, otherwise the quantity of oxygen present in the vessel would produce rapid combustion and intense heat.

I am very much inclined to form the opinion that it is due to some molecular disarrangement of the particles, which sets up an "electrical action" during the fluidity of the chlorate, which would, I think, account for the non-combustibility of the sparks.

Should such be the case, may we not infer that the peculiar odour accompanying the vapour which afterwards passes over is due to the formation of "ozone," which takes place during this supposed electrical action?

The heat employed in the process was that of a small spirit lamp; believing this to be too great, I used a sand-bath, but without success.

I then tried the MnO_2 and KO ClO_5 separately, and, although I obtained some gas it was in so small a quantity as to render the process tedious, and by no means economical; but in neither of these instances did I perceive any sparkling or liberation of chlorine, and this fact produces a very strong impression that there must be some "chemical" change when these two bodies are thus heated together.

My sole object in bringing these remarks before the readers of this Journal, is that I, as well as others, may profit by the practical suggestions of those who may consider the subject worthy their notice, and who are better versed in the science of Chemistry than myself.

I do not pretend to teach, yet when I consider the immense regions in chemical science which still remain unexplored, I cannot but feel that every suggestion which has grown out of observation may be converted into a link and added to that great chain of circumstances which bring about such stupendous results.

We live in an age of progress, and in consequence are not so well contented with mere theories; and as each day sheds new light upon the past of research, we look for practical information and solid facts.

I remain, Sir, yours respectfully,

4, *Union Street, Bristol, Jan.* 18, 1856. G. G. Hornsby.

ON THE COMPOSITION OF BANK-NOTE SLAG.

BY FREDERICK W. GRIFFIN, PH.D.,
Director of the Bristol School of Chemistry.

In Mr. Tomlinson's excellent paper on the Manufacture of Smalt, given in the *Pharmaceutical Journal*, vol. x., p. 503, reference is made to the blue semi-vitrefied slag, or ash, of bank notes. I lately received from Professor Brande a fine specimen of this "relic of departed worth," and deeming it worthy of closer investigation, I induced Mr. David Fry (a gentleman working in my laboratory) to undertake its analysis. This he performed with great care, under my constant supervision. Before giving the results, I will mention certain points of interest in the history of the substance, which I owe to the courtesy of Matthew Marshall, Esq., of the Bank of England, who kindly showed me all the matters described.

It is well known that the Bank rarely issues notes a second time, even if they are returned clean and new. They are, however, preserved for ten years, in case of reference being required; and as they are paid in, at Threadneedle Street and the branches, at the rate of 30,000 per day, they accumulate to a surprising extent. Each day's returns are put by in a box, with the date duly ticketed on its front, and these are ranged on shelves in a series of small rooms in the basement of the building, facetiously designated the "Bank Library." Once a year an *auto-da-fé* is held of those notes whose term of grace has expired, a bonfire being made of them in a kind of furnace or kiln in one of the court-yards. This kiln is octagonal in shape, and about nine feet in diameter by five in height. It is open at top, and the base or hearth is solid, the draught being obtained by numerous perforations in the brick-work of the sides. It is enclosed in a large iron cage, to prevent fragments of the notes from being carried away by the current of heated air. The firing is commenced by kindling some loose notes, and scattering them lightly over the hearth; the bundles are afterwards thrown in pell-mell. The combustion lasts the greater

part of two days; and minute as must be the portion of ash yielded by each note, the total amount from the nine millions consumed becomes very considerable, covering the hearth to some depth. Previous to 1821, a little *smalt* was used in the manufacture of the paper employed, and the silica and potass, of which that is mainly composed, caused the ash to agglomerate into masses, or even occasionally to fuse into a glassy slag, coloured intensely blue by the oxide of cobalt. The use of smalt being discontinued, this product is no longer obtained. At present the ash is much smaller in amount, being simply due to the small quantity of earthy and saline matter naturally contained in the tissue of the paper, and it is white and flocculent like the ashes of vegetable substances in general.

My specimen (which weighs nearly half a pound) is, in appearance, a porous, friable mass of a dull dark blue colour, with streaks and patches of yellow and white. Here and there are portions of a vivid blue, and in some places it is fused into a blebby, opaque, and nearly black glass. A large specimen in the laboratory of the Royal Institution has been completely fused, having moulded itself, with a smooth surface, to the shape of the hearth. This is about an inch in thickness, and very hard and heavy.

To obtain an average sample for analysis, about 1000 grains were taken from different parts of the mass, ground into fine powder in a large agate mortar, and lixiviated by stirring up with water. The portions which readily subsided were reground, till the whole was obtained in a state of impalpable division. The liquid was evaporated to dryness (with the powder) in a platinum basin, the residue thoroughly intermingled, and the various portions taken for analysis from this homogeneous sample were feebly ignited before weighing.

I may remark that the above method is indispensable for the accurate analysis of rocks and minerals. If they are merely ground, with any amount of labour, there are always particles too coarse for complete decomposition by the flux; and if the lixiviating water is thrown away, an equally serious error is introduced, as it almost invariably dissolves sufficient of certain constituents of the substance to leave on evaporation a white crust all over the surface.

A careful qualitative examination (after fluxing with carbonate of soda) showed the presence of the various substances enumerated below, and the *absence* of appreciable traces of baryta, strontia, chromium, cadmium, bismuth, zinc, antimony, or tin. In searching for the two latter metals, the sulphides soluble in sulphide of ammonium were treated with carbonate of ammonia, according to Bloxam's method (*Q. Journal Chem. Soc.*, v. 126). A portion of the powdered slag was also boiled for some time with dilute nitric acid. There was no trace of effervescence, or the least turbidity on adding nitrate of silver to the clear liquid; hence no carbonic acid or chlorine were present.

Boiled with water, the liquid gave (without filtration) strong reactions of lime and sulphuric acid; gypsum had therefore been dissolved out, probably with a little alkaline sulphate, as the indications of sulphuric acid seemed more than proportionate to those of the lime.

The quantitative analysis presented peculiar difficulties; the slag combining, as it does, the complex composition of an ore of cobalt with that of a vegetable ash. It may therefore be worth while to describe the several operations in detail. Exception may be taken to certain points in the method pursued, but I am convinced that the results are as near the truth as the nature of the substance permits.

Great care was bestowed throughout on the washing and weighing of the precipitates, and the amount of the filter-ash was accurately known and deducted.

A.—For the general analysis, 94.913 grs. were fluxed for an hour and a half with three times their weight of carbonate of soda.* The fused lump (detached from the

* A gauze-flame from a cylinder about two inches in diameter answers best for the first hour. The materials slowly agglutinate, slightly shrinking in bulk, but without the smallest projection; and on subsequently applying the full power of a Herapath blowpipe, worked by a hydrostatic cistern, giving a pressure of eighteen or twenty inches of water, the whole melts down into tranquil fusion. A gauze-flame does not produce a sufficiently high temperature to effect complete decomposition with carbonate of soda alone, which is far preferable to the mixture with carbonate of potass, as the latter can hardly be obtained free from silica. I have repeatedly fluxed siliceous minerals in this way, with the mixture pressed down to within a tenth of an inch of the edge of the crucible, and had barely a speck projected on the cover. When the mass is in perfect fusion, curious spiral figures, very similar to those of the chromatrope, keep revolving inward from the sides to the centre.

crucible by placing the latter while still ignited on a mass of cold iron, as recommended by Fresenius) was heated by a water-bath with dilute hydrochloric acid in a covered beaker for twenty-four hours. The residuary silica, after thorough washing with hot water, weighed 41.815 grs. As it was heavy and gritty, and presented a shade of blue, it was refluxed with carbonate of soda at a strong heat. The solution obtained from this was colourless, but on evaporation to dryness, yellow efflorescences were formed on the saline mass ; so that traces of cobalt, &c., were further obtained from this silica. Washed with hot water till no stain was produced on platinum, it weighed 41.009 grs. The difference (.806 gr.) was not very considerable, and was without doubt in small part due to the slight unavoidable waste in emptying out and mixing up such a substance as ignited silica. I have ventured to add .1 gr. to the second weighing, to partly compensate for this loss, making the residuary silica=41.109 grs.

Owing to the presence of the volatile chloride of arsenic, the liquid could not be evaporated to dryness for the separation of the soluble silica till after precipitation with sulphuretted hydrogen. A slow current of that gas was passed through the liquid for seven or eight hours. The precipitate first formed was reddish-brown (lead and copper), then dirty-yellow, becoming finally pure yellow. From the slow rate at which the arsenic went down, it would appear as if at least a portion existed in the state of arsenic acid. The beaker was covered and allowed to stand at rest for twenty-four hours, then warmed, filtered, and the residue well washed. The latter was heated several times with solution of sulphide of potassium, the resulting liquid filtered off from the undissolved metallic sulphides (β), and super-saturated with hydrochloric acid, which produced a copious yellow precipitate of tersulphide of arsenic, mixed with free sulphur (α).

(α.) The above precipitate was collected on a weighed filter, thoroughly washed, placed in a small beaker, covered with a porcelain lid, and dried in a steam oven till the weight remained constant. This was 38.552 grs. As much of this as possible (found by re-weighing to be 37.91 grs.) was detached from the filter and carefully heated with strong nitro-hydrochloric acid in a covered beaker, till all the sulphur was acidified. It had been intended to precipitate this sulphuric acid by baryta, deducting the amount of sulphur so determined from the joint weight, to arrive at that of the arsenic, but a minute loss of liquid rendered this course impracticable. A considerable excess of ammonia, and subsequently sulphate of magnesia, were therefore added instead, and the whole set aside for twenty-four hours. The granular precipitate (all crystalline) of ammonio-arseniate of magnesia was collected on a weighed filter, washed with a mixture of ammonia and water, and dried at 212°. It weighed 3.45 grs., which, corrected for the portion of precipitate left adhering to the filter, gives a per-centage of 1.926 of arsenious or 2.237 of arsenic acid.

(β.) The small portion of undissolved sulphides was treated with nitric acid, the liquid filtered, evaporated nearly to dryness, to get rid of the free acid, mixed with alcohol, and precipitated with dilute sulphuric acid. The sulphate of lead weighed .7996 gr. The oxide of copper was separated by boiling the filtrate with caustic soda. After weighing, it was moistened with nitric acid and re-weighed, when it gave .5393 gr.

The *original solution* was evaporated to dryness on the water-bath, and the residue heated to 300°—320° F. in a Taylor's hot-air oven. It was then treated with hydrochloric acid and diluted. The silica, after thorough washing, weighed 8.8176 grs. During the subsequent steps of the analysis, small portions were further obtained, jointly weighing .7046 gr. The total amount of silica is therefore (residuary) 41.109 + (soluble) 8.8176 + .7046 = 50.6312 grs., or 53.345 per cent.

The filtrate from the silica was heated with excess of acetate of soda. An abundant yellowish-white precipitate of perphosphate of iron was produced, which was thoroughly washed with hot water. It weighed (after twice moistening with nitric acid and re-igniting) 7.26 grs. The phosphoric acid of the slag being in excess of the iron, its further amount was then determined. 15.23 grs. of fine iron wire were boiled with nitro-hydrochloric acid, and the solution added to the liquid ; excess of acetate of soda was poured in, and the whole boiled. The liquid was left quite colourless, as in the preceding operation. The precipitate, treated like the last, weighed 23.2923 grs., which is 1.5353 grs. above the weight of sesquioxide that the iron would yield—the increase being due to phosphoric acid. Both these

precipitates were carefully tested before the blowpipe with borax, and on platinum foil with carbonate of soda and a little nitre. The former gave simply a dirty brown bead, and the latter a grey mass, showing that no traces of cobalt or manganese had been thrown down. This excellent method of separating phosphoric acid seems therefore equally admissible in presence of a variety of metals.

Solution of sulphite of soda, with an excess of caustic soda, were then added to the main solution, which was boiled for some time, and the liquid (*b b*) filtered off from the dense black precipitate (*a a*).

(*a a.*) The precipitate was dissolved in boiling nitro-hydrochloric acid, slightly supersaturated with ammonia, and a little succinate of ammonia added to separate any portion of iron which it was presumed had been previously used in excess; but none was present. Hydrocyanic acid was added, and afterwards caustic soda, till the precipitated cyanides of nickel and cobalt were redissolved. The liquid was then boiled till it lost the smell of hydrocyanic acid, and freshly-precipitated yellow oxide of mercury was added, the boiling being continued. The precipitate was filtered off, thoroughly washed, and ignited in a porcelain crucible till its weight remained constant. This protoxide of nickel was =.6023 gr.

To determine the cobalt, Wöhler's method was pursued. The filtrate was nearly neutralized with nitric acid, and a solution of subnitrate of mercury added as long as a precipitate was formed. This (which was rather copious) was ignited with access of air, and gave .7429 gr. proto-sesquioxide of cobalt, equivalent to .6935 gr. of protoxide, or .731 per cent. It was attempted to determine the manganese, but no ponderable quantity could be separated.

(*b b.*) The liquid was next examined. Excess of hydrochloric acid and a little chlorate of potass being added, it was boiled to destroy any organic matter, and the alumina was then precipitated with a slight excess of ammonia; set aside for twenty-four hours before filtering; washed with hot water till no appreciable stain was left on platinum, and ignited. It weighed 3.453 grs. Though Fresenius implies the contrary (*Quant. Anal.*, p. 301), the above method seemed to effect complete separation of alumina from the oxides of cobalt and nickel.

No excess of iron having been used (as shown by its absence in the precipitate *a a*), it was resolved to try whether phosphoric acid might not be further contained in the liquid. 18.342 grs. iron wire were therefore peroxidized by nitro-hydrochloric acid, added to the liquid, and precipitated by ammonia with the same precautions as before. The weight was 27.414 grs., or 1.212 grains beyond the calculated amount of sesquioxide. The total amount of the phosphoric acid would therefore be 2.7473 grs. (1.5353+1.212 grs.), or 2.8934 per cent., exclusive of that contained in the per-phosphate of iron. It is not easy, however to see how phosphoric acid could co-exist with lime in an alkaline solution, unless, indeed, the large bulk of the liquid containing sal-ammoniac kept a portion of phosphate of lime dissolved.

The lime was then precipitated from the filtrate by oxalate of ammonia, and the magnesia subsequently by phosphate of soda. The lime-precipitate was twice moistened with carbonate of ammonia, and feebly ignited. The last two weighings were almost identical. The weight was 18.1226 grs. = to 10.6926 lime per cent. The phosphate of magnesia weighed 2.5998 grs. = .9843 p. c. of magnesia.

B.—To determine the amount of the *alkalies*, 59.635 grs. of slag were intimately mingled with six times their weight of finely-pulverized fused hydrate of baryta, which had been previously found to contain only mere traces of saline impurities. The mixture was very gently heated at first, but gradually more and more strongly up to full ignition. The mass was heated with dilute hydrochloric acid, the residue filtered off and thoroughly washed, and the liquid precipitated by carbonate of ammonia mixed with caustic ammonia. The filtrate (with the copious washings) was evaporated to dryness in a platinum basin, and ignited; the residue re-dissolved; mixed with a little carbonate of ammonia, and filtered; then again evaporated to dryness, re-dissolved, filtered to separate a small amount of insoluble matter; and lastly evaporated to dryness, and ignited for the third time. The mixed alkaline chlorides weighed 13.9763 grs. They were dissolved in water, the solution evaporated nearly to dryness with excess of bichloride of platinum; the residue treated with strong alcohol, and washed with the same till a few drops, allowed to evaporate spontaneously on a slip of glass, began to show only yellow octohedra under the microscope. (This, by the way, is the best test of the completion of the washing of a precipitate, either of ammonio or potassio-bichloride of platinum, as their washings

always leave some stain, neither of those compounds being wholly insoluble even in ether-alcohol; but the more soluble bichloride and sodio-bichloride of platinum give totally different crystals, of a prismatic or acicular form.) The potassio-bichloride of platinum, dried at 212° weighed 36.435 grs., giving a per-centage of potass = 11.775, and of soda (by difference) = 2.543.

C.—There then remained simply to determine the amount of sulphuric acid. As the carbonate of soda I had by me was not absolntely free from sulphate, I deemed it sufficient to boil the finely-pulverized slag for a length of time with much diluted hydrochloric acid, filter off the liquid,* and precipitate with chloride of barium. 28.335 grs. so treated gave 1.5748 grs. of sulphate of baryta, equivalent to 1.907 per cent. of sulphuric acid.

The above results, when tabulated, give the following as the

COMPOSITION OF BLUE BANK-NOTE SLAG.

Silica	53.345
Alumina	3.638
Lime	10.693
Magnesia	.984
Potass	11.775
Soda	2.543
Cobalt, Protoxide	.731
Nickel, "	.635
Lead "	.620
Copper "	.568
Manganese "	traces
Perphosphate of Iron	7.649
Phosphoric Acid	2.893
Arsenious Acid	1.926
Sulphuric Acid	1.907
	99.907

The most striking feature of the analysis is the singularly large amount of foreign metals forming the mere impurities of the smalt (arsenic, nickel, lead, and copper), as compared with the cobalt itself.

ON THE ELECTRICAL RELATIONS OF TIN AND IRON IN VARIOUS LIQUIDS.

BY G. GORE, ESQ.

1. The following experiments were made with a view to ascertain the general electrical relations of tin and iron to each other in conducting liquids, and to determine in what classes of liquids each was generally most electro-positive to the other, and to draw any further conclusions from the results of the experiments that might be indicated.

2. In each of the experiments the liquid to be examined was contained in a test-tube, immersed vertically in a small water-bath, with a spirit lamp beneath. The metals were each in the form of wires, one-twelfth of an inch in diameter, immersed exactly three inches deep and one-quarter of an inch apart in the liquid, and connected with a suitable galvanometer.

3. Experiment 1. Test-tube containing distilled water, iron was electro-positive to tin at 21° C., deflection of galvanometer needles $3\frac{1}{2}$; but by gradually raising the temperature, the iron became less positive; at 90° C., deflection 1; and at 100° C., tin positive, deflection 5. Experiment 2. Saturated aqueous solution of boracic acid: at 17° C., iron positive, deflection 5; and at 100° C., deflection 26. Experiment 3. Nearly saturated aqueous

* Considerable annoyance is often experienced in the washing similar earthy residues, during the analysis of soils, rocks, &c., from the finely-divided substance beginning to pass through the paper after a certain time, rendering the liquid more and more turbid. This can be entirely prevented by adding a few drops of hydrochloric acid to the washing water, which then continues to pass as bright as at first.

solution of glacial phosphoric acid: at 20° C., tin positive, deflection 23; at 100° C., deflection 37. Experiment 4. Strong sulphuric acid: at 17° C., iron positive. Experiment 5. Equal volumes of strong sulphuric acid and distilled water: at 20° C., tin positive, deflection 42; at 100° C., deflection 46. Experiment 6. One volume of sulphuric acid and nine volumes of water: at 21° C., tin positive, deflection 28; at 100° C., deflection 40. Experiment 7. One volume of sulphuric acid and ninety-six volumes of water: at 22° C., tin positive, deflection $7\frac{1}{2}$; at 100° C., deflection 21. Experiment 8. One volume of sulphuric acid and 192 volumes of water: at 23° C., tin positive, deflection 8; at 40° C., deflection 12; at 60° C., deflection 5; at 80° C., iron positive, deflection 12; and at 100° C., deflection 33.

4. Experiment 9. Strong hydrochloric acid: at 17° C., tin strongly positive. Experiment 10. Three volumes of hydrochloric acid and one volume of water: at 17° C., tin rather strongly positive. Experiment 11. Equal measures of hydrochloric acid and water: at 22° C., tin positive, deflection 38; at 100° C., deflection 46. Experiment 12. One volume of hydrochloric acid and two volumes of water: at 17° C., tin less positive than in experiment 11. Experiment 13. One volume of hydrochloric acid and nine volumes of water: at 21° C., iron positive, deflection 4; at 30° C., tin positive, deflection 4; at 100° C., deflection 40. Experiment 14. One volume of hydrochloric acid and ninety-six volumes of water: at 21° C., iron positive, deflection 22; at 100° C., deflection 32. Experiment 15. Ten grains of hydrochloric acid and half an ounce of water: at 24° C., tin positive, deflection $\frac{1}{4}$; at 100° C., deflection 27. Experiment 16. Seven and a half grains of hydrochloric acid and half an ounce of water: at $23\frac{1}{2}$° C., iron positive, deflection $\frac{1}{2}$; at 60° C., tin positive, deflection $1\frac{1}{2}$; at 100° C., deflection 22. Experiment 17. Five grains of hydrochloric acid and half an ounce of water: at 22° C., iron positive, deflection 1; at 70° C., deflection 6; at 90° C., deflection 4; at 100° C., tin positive, deflection 10.

5. Experiment 18. Strong hydrofluoric acid: at 17° C., tin strongly positive. Experiment 19. One volume of hydrofluoric acid and nine volumes of water: at 20° C., tin positive, deflection 14; at 100° C., deflection 22. Experiment 20. Strong nitric acid: at 17° C., tin very powerfully positive. Experiment 21. Equal volumes of nitric acid and water: at 21 C., tin positive, deflection 43; at 60° C., deflection 35. Experiment 22. One volume of nitric acid and nine volumes of water: at 21° C., tin positive, deflection 38; at 40° C., deflection 10: at 50° C., iron positive, deflection 28; at 95° C., deflection 46. Experiment 23. One volume of nitric acid and ninety-six volumes of water: at 23° C., tin positive, deflection 24; at 100° C., deflection 20.

6. Experiment 24. Strong commercial hydrocyanic acid: at 17° C., tin positive, deflection 3; at 30° C., deflection 6; at 80° C., deflection 2; at 90° C., iron positive, deflection 4; at 100 C., deflection 8. Experiment 25. Equal volumes of strong commercial hydrocyanic acid and water: at 18° C., iron positive, deflection 2; at 80° C., deflection 17; at 100° C., deflection 0. Experiment 26. Strongest liquid acetic acid: at 19° C., tin positive, deflection 4; at 50° C., deflection $\frac{1}{2}$; at 60° C., iron positive, deflection 1; at 100° C., deflection 4. Experiment 27. Equal volumes of strongest liquid acetic acid and water: at 17° C., tin positive, deflection $12\frac{1}{2}$; at 40° C., deflection 2; at 50° C., iron positive, deflection 12; at 80° C., deflection 18; at 100° C., deflection 2. Experiment 28. Nearly saturated aqueous solution of citric acid: at 18° C., tin positive, deflection 14; at 100° C., deflection 29.

7. Experiment 29. Saturated aqueous solution of oxalic acid: at 18° C., tin positive, deflection 28; at 100° C., deflection 41. Experiment 30. Equal volumes of a saturated aqueous solution of oxalic acid and water: at 18° C., tin positive, deflection 21; at 100° C., deflection 39. Experiment 31. Saturated aqueous solution of tartaric acid: at 18° C., tin positive, deflection 21; at 100° C., deflection 33. Experiment 32. Fifty grains of tartaric acid and three hundred

grains of water: at 18° C., tin positive, deflection 8; at 100° C., deflection 29. Experiment 33. Tin was very feebly positive at 17° C. in an aqueous solution of benzoic acid; also in solutions of succinnic acid, tannic acid, and gallic acid, in vegetable naphtha.

8. Experiment 34. Strong aqueous ammonia: at 17° C., iron feebly positive. Experiment 35. Saturated aqueous solution of sesquicarbonate of ammonia: at 20° C., tin positive, deflection 10; at 100° C., deflection 30. Experiment 36. Aqueous solution of hydrosulphate of ammonia: at 17° C., tin powerfully positive. Experiment 37. A nearly saturated aqueous solution of sulphate of ammonia: at 20° C., iron positive, deflection 5; at 100° C., deflection 19. Experiment 38. Saturated aqueous solution of hydrochlorate of ammonia: at 21° C., iron positive, deflection $3\frac{1}{2}$; at 100° C., deflection 10. Experiment 39. Two grains of hydrochlorate of ammonia and half an ounce of water: at $26\frac{1}{2}$° C., iron positive, deflection 8; at 100° C., deflection 21. Experiment 40. A nearly saturated aqueous solution of nitrate of ammonia: at 21° C., iron positive, deflection 22; at 60° C., deflection 30; at 100° C., deflection 18. Experiment 41. A nearly saturated aqueous solution of acetate of ammonia: at 21° C., tin positive, deflection $2\frac{1}{2}$; at 80° C., deflection 30.

9. Experiment 42. Saturated aqueous solution of carbonate of potash: at 21° C., tin positive, deflection 16; at 100° C., deflection 38. Experiment 43. Two grains of carbonate of potash and half an ounce of water: at 27° C., tin positive, deflection $2\frac{1}{2}$; at 100° C., deflection 22. Experiment 44. One and a half grains of carbonate of potash and one ounce of water: at 26° C., tin positive, deflection $\frac{1}{2}$; at 100° C., deflection 25. Experiment 45. Two grains of bicarbonate of potash and half an ounce of water: at 24° C., iron positive, deflection $\frac{1}{2}$; at 100° C., deflection $3\frac{1}{2}$. Experiment 46. Strong aqueous solution of "liver of sulphur:" at 21° C., tin positive, deflection 37, at 100° C., deflection 35. Experiment 47. Saturated aqueous solution of sulphite of potash: at 21° C., deflection 0; at 30° C., tin positive, deflection $\frac{1}{2}$; at 50° C., deflection 10; at 100° C., deflection $32\frac{1}{2}$. Experiment 48. Saturated aqueous solution of sulphate of potash: at 20° C., iron positive, deflection 1; at 50° C., deflection $2\frac{1}{2}$; at 70° C., tin positive, deflection 3; at 100° C., deflection 25.

10. Experiment 49. Strong aqueous solution of iodide of potassium: at 20° C., tin positive, deflection 7; at 100° C., deflection 30. Experiment 50. Saturated aqueous solution of chloride of potassium: at $32\frac{1}{2}$° C., tin positive, deflection $17\frac{3}{4}$; at 100° C., deflection $27\frac{3}{4}$. Experiment 51. Three grains of chloride of potassium and one ounce of water: at 29° C., iron positive, deflection $7\frac{1}{2}$; at 100° C., deflection 24. Experiment 52. Saturated aqueous solution of chlorate of potash: at 20° C., iron positive, deflection 2; at 40° C., deflection 3; at 70° C., tin positive, deflection 4; at 100° C., deflection 27. Experiment 53. Same solution as the last one, but kept saturated by free salt at all the temperatures: at 22° C., iron positive, deflection 5; at 30° C., tin positive, deflection 10; at 100° C., deflection 38. Experiment 54. Five grains of chlorate of potash and one ounce of water; at 21° C., iron positive, deflection 5; at 50° C., deflection 1; at 60° C., tin positive, deflection 5; at 100 C., deflection 34.

11. Experiment 55. Saturated aqueous solution of nitrate of potash: at 21° C., iron positive, deflection 4; at 70° C., deflection 10; at 98° C., deflection 4; at 100° C., tin positive, deflection 13. Experiment 56. Two grains of nitrate of potash and half an ounce of water: at 27° C., iron positive, deflection 1; at 100° C., deflection 11.

12. Experiment 57. Saturated aqueous solution of ferrocyanide of potassium (yellow prussiate of potash): at 20° C., iron positive, deflection $\frac{1}{4}$; at 50° C., tin positive, deflection $\frac{1}{2}$; at 100° C., deflection 8. Experiment 58. Saturated aqueous solution of cyanide of potassium: at 20° C., tin positive, deflection 18; at 90° C., deflection 18; at 95° C., iron positive, deflection 10; at 100° C., tin positive, deflection 35. Experiment 59. Nearly saturated aqueous solution of

acetate of potash: at 20° C., tin positive, deflection 2; at 100° C., deflection 11½. Experiment 60. Saturated aqueous solution of tartrate of potash: at 20° C., tin positive, deflection ¾; at 100° C., deflection 24. Experiment 61. Saturated aqueous solution of bitartrate of potash: at 20° C., iron positive, deflection 1½; at 90° C., deflection 13; at 100° C., tin positive, deflection 14. Experiment 62. Saturated aqueous solution of oxalate of potash: at 20° C., tin positive, deflection 25; at 100° C., deflection 38½. Experiment 63. Five grains of oxalate of potash and one ounce of water: at 20° C., tin positive, deflection 22; at 100° C., deflection 36½. Experiment 64. Saturated aqueous solution of citrate of potash: at 20° C., tin positive, deflection 6; at 100° C., deflection 30.

13. Experiment 65. Saturated aqueous solution of carbonate of soda: at 21 C., tin positive, deflection 7; at 100° C., deflection 35. Experiment 66. Saturated aqueous solution of bicarbonate of soda: at 24° C., tin positive, deflection 16; at 100° C., deflection 38. Experiment 67. Saturated aqueous solution of borate of soda: at 24° C., tin positive, deflection 2½; at 100° C., deflection 38. Experiment 68. Five grains of borate of soda and one ounce of water: at 21° C., tin positive, deflection 1; at 100° C., deflection 31. Experiment 69. Saturated aqueous solution of diphosphate of soda: at 22° C., tin positive, deflection 3½; at 100° C., deflection 29½. Experiment 70. Saturated aqueous solution of dry dipyrophosphate of soda: at 21° C., tin positive, deflection 26; at 100° C., deflection 34.

14. Experiment 71. Saturated aqueous solution of hyposulphite of soda: at 24° C., tin positive, deflection ¼; at 100° C., deflection 27. Experiment 72. Saturated aqueous solution of sulphate of soda: at 22° C., iron positive, deflection 22; at 100° C., deflection 34. Experiment 73. Saturated aqueous solution of chloride of sodium: at 21° C., iron positive, deflection 1; at 40° C., tin positive, deflection ½; and 100° C., deflection 5. Experiment 74. Saturated aqueous solution of nitrate of soda: at 22° C., iron positive, deflection 2; at 80° C., deflection 1; at 95° C., tin positive, deflection 2½; at 100° C., deflection 5. Experiment 75. Saturated aqueous solution of ammonia-phosphate of soda: at 21° C., tin positive, deflection 9; at 100° C., deflection 28½.

15. Experiment 76. Saturated aqueous solution of acetate of soda: at 22° C., tin positive, deflection 2; at 100° C., deflection 30. Experiment 77. Saturated aqueous solution of oxalate of soda: at 22° C., tin positive, deflection 20; at 100° C., deflection 32. Experiment 78. Strong aqueous solution of citrate of soda: at 20° C., tin positive, deflection 22; at 100° C., deflection 30. Experiment 79. Saturated aqueous solution of tartrate of soda: at 20° C., tin positive, deflection 2; at 100° C., deflection 20. Experiment 80. Saturated aqueous solution of tartrate of potash and soda: at 20° C., tin positive, deflection 3; at 100° C., deflection 18.

16. Experiment 81. Saturated aqueous solution of chloride of barium: at 20° C., iron positive, deflection 5; at 100° C., deflection 12. Experiment 82. Saturated aqueous solution of nitrate of baryta: at 19° C., iron positive, deflection 2½; at 90° C., deflection 2; at 100° C., tin positive, deflection 11. Experiment 83. Saturated aqueous solution of nitrate of strontia: at 19° C., iron positive, deflection 7½: at 80° C., deflection 1; at 90° C., tin positive, deflection 1½; at 100° C., deflection 7. Experiment 84. Saturated aqueous solution of sulphate of magnesia: at 20° C., iron positive, deflection 3¼; at 95° C., deflection 2; at 100° C., deflection 0. Experiment 85. Saturated aqueous solution of commercial alum: at 18° C., iron positive, deflection 15; at 100° C., deflection 38. Experiment 86. Saturated aqueous solution of bichromate of potash: at 21° C., tin positive, deflection 1½; at 100° C., deflection 10½.

17. Experiment 87. Solution of hydrochlorate of terchloride of antimony (the ordinary chloride of antimony as prepared for pharmaceutical purposes): at 16° C., tin strongly positive. Experiment 88. Saturated aqueous solution of

mono-sulphate of zinc: at 21° C., iron positive, deflection 6½; at 100° C., deflection 27. Experiment 89. Saturated aqueous solution of chloride of zinc: at 19° C., tin positive, deflection 2; at 100° C., deflection 29½. Experiment 90. Saturated aqueous solution of mono-nitrate of zinc: at 20° C., tin positive, deflection 17; at 100° C., deflection 37. Experiment 91. Saturated aqueous solution of chloride of zinc and ammonium, formed by dissolving zinc oxide in an aqueous solution of hydrochlorate of ammonia: at 20° C., iron positive, deflection 8; at 100° C., deflection 28½. Experiment 92. Saturated aqueous solution of acetate of zinc: at 21° C., iron positive, deflection 3; at 70° C., deflection 4; at 80° C., tin positive, deflection 15; at 100° C., deflection 24.

18. Experiment 93. Saturated aqueous solution of protochloride of tin: at 20° C., iron positive, deflection 11; at 100° C., deflection 14. Experiment 94. A solution of ninety-five grains of protochloride of tin and three hundred grains of water: at 17° C., tin feebly positive. Experiment 95. Saturated aqueous solution of nitrate of lead: at 19° C., tin positive, deflection 21¼; at 100° C., deflection 44. Experiment 96. Saturated aqueous solution of acetate of lead: at 20° C., iron positive, deflection 3; at 50° C., deflection 2; at 60° C., tin positive, deflection 6; at 100° C., deflection 25. Experiment 97. Saturated aqueous solution of protochloride of iron: at 19° C., tin positive, deflection 5½; at 100° C., deflection 29½. Experiment 98. Equal volumes of a saturated solution of protochloride of iron and water: at 20° C., iron positive, deflection 10; at 100° C., deflection 25. Experiment 99. "Tinctura-ferri-muriatis:" at 17° C., tin strongly positive.

19. Experiment 100. Saturated aqueous solution of protochloride of copper: at 17° C., tin strongly positive. Experiment 101. Saturated aqueous solution of nitrate of copper: at 17° C., tin very strongly positive. Experiment 102. Saturated aqueous solution of chloride of copper and ammonium, formed by dissolving cupric oxide in a warm solution of hydrochlorate of ammonia: at 17° C., tin strongly positive. Experiment 103. Saturated aqueous solution of acetate of copper; at 17° C., tin strongly positive. Experiment 104. Strong aqueous solution of bichloride of platinum: at 17° C, tin very strongly positive.

20. It will be found on examining the foregoing results, that tin was positive to iron altogether 155 times, and iron positive to tin 81 times; and as the liquids used included both mineral and organic acids, concentrated and dilute; also carbonated alkalies, and a considerable number and variety of salts; we are justified in concluding that tin is electro-positive to iron in conducting liquids generally, in the proportion of about 155 to 81, or nearly two to one.

21. With regard to the influence of temperature of the liquid, we find that the proportion of times in which tin was positive to iron was somewhat greater at a high temperature than at a low one. Thus, it was positive to iron between 90° and 100° C., in the proportion of 62 to 26 times; and between 15° and 30° C., in the proportion of 67 to 36 times.

22. And with regard to the influence of the kind of liquids, we may remark that amongst those used, there appears to be no particular substance or class of substances in which the affinities and electrical conditions of tin and iron are widely different at those temperatures. Of all the liquids used, those containing hydrochloric, oxalic, tartaric, and citric acids; chloride of potassium; chlorate, oxalate, tartrate, and citrate of potash or soda; appear to possess the strongest influence in rendering tin electro-positive to iron; and of these, the only ones in which tin was always electro-positive to iron, whether the liquids were more or less dilute or at different temperatures, were oxalic acid and oxalate of potash.

Birmingham.

CHEMICAL INFLUENCE OF ELECTRICITY, HEAT, AND LIGHT.*

BY C. F. SCHÖNBEIN.

The chemical phenomena which are produced by purely physical causes—electricity, heat, and light, appear to merit especial attention. It is known that these agencies determine the combination or decomposition of many substances, and likewise produce remarkable alterations of the chemical and physical characters of some elementary substances. As yet nothing is known of the mode in which these effects are produced—all the views that have been put forward in reference to them are merely hypothetical.

So long as these phenomena remain inexplicable, there can be little hope of arriving at an understanding of those more complicated chemical phenomena which are produced by the joint co-operation of physical agencies with material substance.

The deficiency of knowledge in this respect is in no small degree to be attributed to the undue influence of certain doctrines which have grown to be regarded as demonstrated facts, and as capable of furnishing an explanation of all chemical phenomena.

Of this kind is the hypothesis, which, assuming the existence of unalterable material atoms, regards chemical combination as a simple juxtaposition of diverse atoms, and chemical decomposition as a simple separation of these atoms.

According to the recognised views, all chemical phenomena are represented to us as nothing more than the results of diverse arrangements of elementary atoms, whose individuality remains unaltered.

It is obvious that those who regard chemical action as in some sort mechanical, cannot do otherwise than form a mechanical conception of the influence of electricity, heat, and light, upon the chemical agency of substances, and regard this influence as consisting in approximation or further separation of the atoms, whether homogenous or heterogenous.

It cannot be denied that there is great plausibility in such a mechanical representation of chemical phenomena ; the imagination readily entertains the notions of small particles, their motion, combination, and separation. But whether on that account this view adequately represents the phenomena of chemical action, or even whether it possesses probability, are questions that cannot be discussed here, it will suffice to observe, that we are far from regarding chemical action as a mere mechanical arrangement of atoms.

The object of this memoir is to develop and establish some opinions which I have long entertained in regard to the immediate cause of decomposition and combination determined by electricity, heat, and light.

In the first instance, I will speak of decomposition effected under the influence of these agents.

1. Electrolysis.—By this term I understand any chemical decomposition produced by electrical discharge.

Before entering upon the consideration of this form of decomposition, I must speak of the chemical influence exercised by electricity upon elementary substances, for my views regarding the immediate cause of electrolysis are based upon this influence.

In conformity with the conceptions hitherto entertained of elementary substances, it would not have been supposed that electrical discharge would have produced any kind of alteration in their chemical characters. Nevertheless, recent observations have proved the contrary, especially in the case of oxygen.

If there is one substance which might more than another be regarded as simple, it is undoubtedly oxygen. This gaseous substance, represented by the prevailing view as an aggregation of peculiar unalterable atoms surrounded by thermic atmospheres which effect their mutual repulsion, has hitherto been considered incapable of experiencing in itself any kind of chemical change. It does, however, undergo one of the most remarkable alterations of character, which appears very much like a substantial change.

Oxygen which has been exposed to the influence of the electrical discharge, is converted into a substance possessing characters of which it was previously destitute,

---

* *Journal für Praktische Chemie*, July, 1855. "Aus den Verhandlungen der Naturforschenden Gesellschaft in Basel, vom Verfasser mitgetheilt."

and constituting the substance to which, on account of its odour, I have applied the name of ozone, and which was fully described in a previous memoir.*

It is obvious that the oxygen in water exists in a state essentially different from that of free ozonised oxygen, and it will readily be admitted that there is no reason why oxygen should be separated from its state of combination in water while it remains in the state proper to that compound.

If, however, the oxygen combined with hydrogen shared with free oxygen the capability of altering its condition under certain circumstances, and of assuming a condition in which its relations to the hydrogen associated with it became altogether different from those which in its previous state it bore to hydrogen, the existence of the water would be at an end. Such an allotropism of oxygen must be at once followed by decomposition of water, without any necessary intervention of attractive or repulsive force.

It would seem probable that oxygen combined with hydrogen is capable of undergoing the same alteration as free oxygen, of becoming ozonized under the influence of the electrical discharge, and that this circumstance is the immediate cause of the electrolysis.

Supposing this opinion to be correct, oxygen would at the moment of separation from water by the voltaic current, which is nothing other than electrical discharge, possess the chemical characters proper to oxygen ozonized by electrical sparks.

Consequently electrolytic oxygen should be capable, at the moment of liberation, of oxidizing at the ordinary temperature a great number of substances, with which, under otherwise similar circumstances, ordinary oxygen does not combine.

It has been found that oxygen, separated from water by electrolysis, does actually produce all the effects of ozonized oxygen.

It has been attempted to ascribe the powerful oxidizing action of electrolytic oxygen to its nascent state, and to regard the gaseous state as a physical condition, which is an obstacle to the exercise of its affinity. But it is evidently not the gaseous state which determines the chemical indifference of ordinary oxygen, for ozonized oxygen is as powerfully oxidant as nascent electrolytic oxygen. If the remarkable oxidizing influence of ozonized oxygen is dependent upon some other condition than its state of aggregation, it is also probable that the eminent oxidizing character of electrolytic oxygen depends upon something other than its nascent condition.

In regard to this point, the fact that the oxygen generated in the electrolysis of water contains a perceptible quantity of ozonized oxygen is in the highest degree worthy of notice.

Baumert is of opinion that the odorous oxidant substance mixed with this oxygen is not pure ozonized oxygen, but a hydrate of it, represented by $HO+2\overset{\circ}{O}$† or HO^3 ; but even admitting this to be the case, the significance of the fact alluded to is by no means lessened.

Thenard's peroxide of hydrogen may certainly be regarded as a hydrate of ozonized oxygen, $HO+\overset{\circ}{O}$, since the chemical action is in all points analogous to that of pure ozonized oxygen.

The experiments made by Meidinger have satisfactorily proved that in the electrolysis of water a sensible amount of $HO+\overset{\circ}{O}$ is produced around the positive electrode, as was long conjectured from the circumstance that in the electrolysis of water, the volume of hydrogen evolved is rather more than twice that of the oxygen ; and, further, that water which had been for some time in contact with a positive electrode, possesses the property of producing a deep blue colour with iodide of potassium and starch paste.

These facts appear to me to favour the opinion that oxygen is, at the moment of its liberation by electrolysis, in an ozonized state, and more especially so since ordinary oxygen cannot be combined with water to form peroxide of hydrogen.

It is, however, questionable why the greater part of the oxygen produced by the electrolysis of water presents itself in the ordinary condition.

It is well known that Thenard's peroxide of hydrogen is split up into ordinary oxygen and water by the mere contact with a number of substances particularly gold and platinum, but the rationale of this influence is quite unknown.

---

* *Pharmaceutical Journal*, vol. xiv., p. 216.

† $\overset{\circ}{O}$ represents the allotropic, ozonized or active modification of oxygen.

Now, if the whole of the ozonized oxygen separated at the positive electrode in the electrolysis of water were to combine with HO, forming HO+O, it is evident that if the electrode were gold or platinum this compound would be decomposed into HO and O, only a small portion escaping this decomposition, and Meidinger has shown that even this residual quantity is decomposed without aid of the voltaic current by immersing a clean plate of gold or platinum in the gas. The oxygen thus obtained is identical with that evolved during the electrolysis, and there appears to be every reason for supposing that both originate from the allotropant influence of the electrode upon HO + O. It would, indeed, be very difficult to account in any other manner for the fact that greater part of the oxygen appears in the ordinary condition, while only a minute portion produces HO^2.

Greater part of the substances capable of electrolysis are oxidized substances, and if the halogens chlorine, bromine, iodine, and fluorine, are regarded as oxygen compounds, in accordance with the older view which I am disposed to adopt, all true electrolytes would be oxygen compounds.

This circumstance seems to me to be of great significance, and to show that oxygen plays an important part in electrolysis in the more limited sense of the term; that, in fact, it determines electrolytic decomposition.

Among the simple oxyelectrolytic substances are the oxides represented by the formula RO, and it is evident that any theory of electrolysis must consider the electrolysis of these substances as exactly similar to that of water.

If potash, soda, oxide of lead, &c. were liquid at the ordinary temperature their electrolysis would present the same secondary phenomena as that of water; peroxides of potassium, sodium, or lead, &c., would be formed at the positive electrode. But at the high temperature requisite for the liquefaction of these substances, their peroxides cannot exist any more than peroxide of hydrogen can exist at the temperature of 212° Fah., for under these conditions the O, separated by electrolysis, is converted into ordinary oxygen.

It is a very remarkable feature of ordinary electrolysis that the constituents of the electrolyte are not evolved together, but at different places, and in this respect electrolysis differs from any other kind of chemical decomposition. Some very singular attempts have been made to account for this fact, among which that proposed by Grotthus and Faraday may be regarded as the most adequate.

According to their view, it is assumed that in the electrolysis of water, the hydrogen liberated from the water in immediate contact with the positive electrode, combines with the oxygen of the next particle of water, while its hydrogen combines with the oxygen of the next particle, and so a progressive decomposition and reproduction of water takes place throughout the liquid towards the negative electrode, where the hydrogen of the water in immediate contact with it is liberated.

It seems, however, that this statement of the fact is defective, inasmuch as it does not afford any adequate reason for the assumption made, that the hydrogen of a particle of water situated between the electrodes should separate from its oxygen in order to combine with the perfectly similar oxygen of the contiguous particle of water, or why, on the other hand, the oxygen of such a particle of water separates from its hydrogen, and combines with that of the water particle nearer to the positive electrode. Again, the assumption that the voltaic current is an "axis of power," producing opposite chemical effects in opposite directions—increasing the affinity of hydrogen for oxygen towards the negative electrode, and decreasing it towards the positive electrode—is rather a periphrastic statement of the fact than an explanation of it.

It seems to me possible that this progressive liberation or transfer of hydrogen towards the negative electrode, or the alternate decomposition and reproduction of water, may be connected with a mechanical current. It is known that the particles, even of solid substances, such as carbon, platinum, &c., may be carried from the positive to the negative pole of a voltaic battery. The experiments of Armstrong and of others, particularly those of Wiedemann, have shown that the voltaic current does not merely electrolyse, but also causes a flow of the electrolytic liquid from the positive to the negative electrode, that is, in its own direction, and that the quantity of electrolyte transferred in this manner, is proportional to the strength of the current.

These facts admit of the conjecture that under suitable conditions, this motion from positive to negative electrode is communicated to all substances situated in the

path of the current, and, perhaps, for this reason it might also be assumed that the cathion of an electrolyte would be similarly affected in electrolysis.

Assuming that the oxygen of the water situated at the positive electrode is ozonized by the electric discharge; that in consequence of this, its combination with the hydrogen ceases, and further, assuming that this hydrogen at the moment of its separation, is impelled towards the negative electrode by the mechanical current above alluded to, then this hydrogen must, in the first instance, come in contact with the oxygen of the contiguous water particle, inasmuch as we are compelled to suppose the oxygen side of all the water particles situated between the electrodes is turned towards the positive electrode. But, in conformity with my hypothesis, this oxygen must, like the oxygen of all other water particles situated between the electrodes, be in the ozonized condition from the influence of the electrical discharge.

It might with reason be asked, why this ozonized oxygen combines with the hydrogen of the water particle at the positive electrode? why the ozonized oxygen of any of the water particles situated between the electrodes should combine with the hydrogen of the contiguous water particle nearer to the positive electrode? why the oxygen and hydrogen of all these water particles should not be liberated?

An adequate answer of these questions would solve the most essential points of the problem of electrolysis, and would furnish an explanation of the decomposition and reproduction of water between the electrodes.

In attempting to obtain an answer to these questions, it seems to me above all things requisite to consider the remarkable fact, that one and the same agent is in many instances capable of producing effects directly opposite in kind. Thus, for example, electrical discharge will convert ordinary oxygen into $\dot{O}$, and ozonized oxygen into O. The electric spark will decompose water or hydrochloric acid into their constituent gases, and likewise reproduce them from these gases.

This simultaneous production of opposite effects by one and the same agent is, in my opinion, a very important fact, because it shows that the conditions which determine the ozonization or disozonization of oxygen, the decomposition or production of water, &c. are so similar as to appear perfectly alike, and that the slightest difference in the prevailing circumstances determines whether one or other effect is produced.

The importance of the present question must be an excuse for referring to some other facts by which I have repeatedly endeavoured to show that oxygen in the ordinary condition is incapable of entering into combination with any substance; that in every instance oxidation is preceded by ozonization, or chemical excitation of the oxygen; and that this alteration of condition is effected either by the substance oxydized, as for example, by phosphorus in its slow combustion, in dilute oxygen or atmospheric air; or by the allotropant influence of a third substance, as for example, platinum in the slow combustion of hydrogen in atmospheric air; or by the influence of light, heat, or electricity, of which we have numerous examples; for instance, in the conversion of sulphide of lead into sulphate under the influence of light and oxygen; in the oxidation of elementary substances at high temperatures; in the production of nitric acid from nitrogen and oxygen under the influence of the electric spark.

The opinion that the oxidation of a substance by ordinary oxygen must be preceded by the ozonization of the oxygen, is by no means such an arbitrary assumption as many chemists are disposed to consider; and it appears to me to be rendered highly probable by a considerable number of facts.

One of these facts, and not the least important of them, is, that although the greater part of the ozonized oxygen, produced by the contact of phosphorus with atmospheric air or sufficiently rarefied oxygen, is at once consumed in the oxidation of the phosphorus, still a by no means inconsiderable portion of it remains free.

So likewise in the combustion of an explosive mixture of hydrogen and oxygen, my own experiments and those of other chemists show that some part of the ozonized oxygen escapes combination with hydrogen, and again in the production of nitric acid, by means of the electric spark, in a mixture of nitrogen and ordinary oxygen.

My experiments have likewise shown that ordinary oxygen, in contact with camphene or ether, and under the influence of light, is first ozonized and then combines with these substances, producing resin, &c.

It is the ozonized oxygen, recognizably produced under these circumstances, which I believe is the most essential condition of the oxidation of any substance by ordinary oxygen.

But if this is an indispensable condition of oxidation, and if the electrolysis of water or of any other oxyelectrolyte depends upon the conversion of O into Ȯ, we are brought to the singular conclusion, that the conditions of the decomposition and production of water are essentially identical. And, in fact, the similarity of these conditions is in no instance so prominently perceptible as in the electrolysis of water; for the simultaneous decomposition and reproduction of water between the electrodes is effected by one and the same cause—by the voltaic current or electrical discharge.

By interrupting the continuity of the water between the electrodes, by means of a conducting and difficultly oxidizable substance, it may easily be shown that at the moment oxygen is evolved at the positive electrode, or when the combination of the hydrogen with the oxygen of the contiguous water particle takes place, the oxygen of each water particle is in the ozonized condition; for oxygen appears at the surface of the immersed metal facing the negative electrode, being prevented by the platinum from combining with the hydrogen of the next water particle; and as this oxygen possesses at the moment of its liberation the same eminent oxidizing characters as that evolved at the positive electrode, it may be concluded that both are in the same ozonized condition; and the same thing will apply to the oxygen of all the other water particles.

It appears undoubted that the oxygen of all the water particles situated between the electrodes are simultaneously in that condition which is so favourable to their combination or separation from hydrogen, and this condition may be regarded as one of instable equilibrium disturbed by the most trivial circumstances.

Now, assuming that at the moment of the ozonization of the oxygen of the water particle at the positive electrode, its hydrogen were impelled towards the negative electrode by the above-mentioned mechanical current, it is conceivable that this impulsion communicated in like manner to the hydrogen of all other water particles situated between the electrodes would be sufficient to disturb the equilibrium of the ozonized oxygen, or in other words to cause the decomposition of these water particles, and the reproduction of water from their elements.

It is likewise probable that the transfer of water towards the negative electrode, observed by Wiedemann, and the law obtained by him that the quantity of water transferred to the negative electrode, and the quantity of water electrolysed are proportional to the intensity of the current, may be immediately connected with the simultaneous transfer of hydrogen towards the negative electrode.

Conformably with this view the ordinary electrolysis of an oxyelectrolyte would be determined on the one hand by the ozonization of its oxygen, on the other hand by the motion communicated to the cathion of the electrolyte by the ozonizing current in its own direction, and it is not necessary to assume that the current likewise communicates to the oxygen of the electrolyte a motion opposite to that in which the cathion is impelled.

The transfer of oxygen towards the positive electrode would therefore be merely apparent or relative, owing to the actual transfer of the cathion towards the negative electrode.

The question, Why the current, under certain circumstances, carries with it substances in its own direction? I confess I am as much unable to answer as to explain why the electrical discharge should at the same time be capable of ozonizing and deozonizing? Why in the production of water Ȯ is converted into O, while in the decomposition of water the reverse takes place? At present it is more desirable to ascertain the actual conditions under which the formation and decomposition of water and other electrolytes take place, than to seek for an insight into these conditions themselves, *i. e.* the allotropic modifications of oxygen in the formation and decomposition of water.

It is well ascertained that oxygen salts, when melted or dissolved in water, are decomposed by the voltaic current whatever may be their stochiometric composition. Many physicists regard these salts as electrolytes in which the base is the cathion, the acid, the anion, and asume on this account that the voltaic current decomposes them into acid and base in the same manner as water into oxygen and hydrogen.

In the electrolysis of an oxygen salt dissolved in water, oxygen is evolved at the positive electrode together with the acid; and hydrogen at the negative electrode, together with the base; and these physicists must therefore admit that water is decomposed as well as the salt. In those cases when instead of the base the metalli

radical is separated at the negative electrode, and no hydrogen is evolved, they must admit that the basic cathion of the salt is reduced by the cathion of the water liberated simultaneously with it, and that the appearance of the metal is a secondary phenomenon. It has justly been objected to this view that it is inconsistent with the established electrolytic action of the current.

With regard to this point it is a well-established fact that the same current which decomposes an equivalent of water when transmitted through a solution of sulphate of soda, &c., decomposes an equivalent of water, and likewise an equivalent of the salt; consequently it would appear that the current produces double the effect in the saline solution that it does in the water alone; an assumption which appears as unfounded as that the same force should produce an effect in one case double as great as in another.

Daniell endeavoured to remove this contradiction, and to bring the results of the electrolysis of oxygen salts into agreement with the above-mentioned law.

Davy found himself compelled to invent a complicated hypothesis of the constitution of acids, and of the composition of oxysalts, in order to make his view of the chemical nature of the oxidized muriatic acid of the older chemists consistent with the analogy which so evidently exists between the oxygen salts and the haloid salts.

All oxygen acids must be hydrogen acids, and all oxygen salts haloid salts; hydrated sulphuric acid, oxysulphide of hydrogen, sulphate of potash, oxysulphide of potassium, as muriatic acid and muriate of potash, were changed to hydrochloric acid and chloride of potassium. The productive imagination of this chemist created as many compound halogens as there were acids known, and they were supposed to bear the same relation to hydrogen and the metals that chlorine does. In order to remove a few hypothetical substances from the chemical system, the originator of the chlorine theory did not hesitate to introduce a legion of others.

Daniell endeavoured to show that the electrolysis of oxygen salts furnished decisive evidence in favour of the hypothesis of his countryman. He says :—

"For example, sulphate of soda, according to Davy's theory of salts, would be $Na\,SO_4$ and Na the cathion; SO_4 the anion of this electrolyte, so that in conformity with the law referred to, the current would liberate an equivalent of sodium at the negative electrode, and an equivalent of oxysulphion at the positive electrode. But since the latter cannot exist alone, it assimilates at the moment of electrolytic separation an equivalent of hydrogen from the water present, forming HSO_4, and thus liberates an equivalent of oxygen at the positive electrode. The sodium liberated at the negative electrode likewise decomposes water, forming potash with its oxygen, and liberating an equivalent of hydrogen."

According to Daniell, therefore, the equivalent of oxygen evolved at the positive electrode, and the equivalent of hydrogen evolved at the negative electrode, are ordinary chemical products, and the acid and base separated at the electrodes are secondary products, so that in this case there would be no actual ion liberated in the electrolysis, and all the substances appearing at the electrodes would have a secondary origin.

It is only in the electrolysis of those oxygen salts which contain a less easily oxidizable metal, such as lead, copper, &c., that a true ion—the metallic cathion—lead, copper, &c., would make its appearance, because they do not decompose water.

It must be admitted that the results of electrolysis of oxygen salts are not inconsistent with Davy's salt theory; but the observation of Daniell that they can only be brought into agreement with the law of definite electrolytic action of the current by means of this hypothesis I cannot agree with, and cannot, therefore, admit the specific evidence which he considered it furnished. As I have from other grounds come to the conclusion that the chlorine theory put forward by Davy is unfounded, I cannot of course agree with his views of the constitution of acids, salts, &c., and must consequently seek some other explanation of the electrolysis of oxygen salts than that of Daniell, although without running into contradiction of the above-mentioned law, because I consider that any explanation which is inconsistent with that, cannot be correct.

I start from the assumption that in all oxygen salts the current acts only upon the oxygen of the base, and has nothing to do with the acid, or what is the same thing, that the electrolytic influence of the current is exerted only upon the base of the salt, and, consequently that, in the electrolysis of sulphate of soda, the sodium alone

is transferred from the positive to the negative electrode. This may be represented by the following diagram:

	A	B	C	
$\dot{E}$	ONa	ONa	ONa	$\bar{E}$
	SO_3	SO_3	SO_3	

If $\dot{E}$ $\bar{E}$ represent the electrodes, A B C, three particles of sulphate of soda dissolved in water, then in the electrolysis of this salt the sodium of A would be transferred towards B, the sodium of B towards C, the sodium of C towards $\bar{E}$, and the oxygen of A would be evolved at $\dot{E}$.

Then when the oxygen of A is separated at $\dot{E}$ and the sodium of the same particle is transferred to B, the sulphuric acid of A will become free at $\bar{E}$, without any influence being exercised upon it by the current.

The sodium liberated at the negative electrode will decompose water, liberating hydrogen and forming soda, and thus it is evident that for every equivalent of oxygen evolved at the positive electrode there must be an equivalent of sulphuric acid liberated, and at the negative electrode an equivalent of soda and an equivalent of hydrogen, and there is no necessity for assuming as an explanation of this fact that the current electrolyses an equivalent of water together with the equivalent of sulphate of soda.

Conformably with this view there would not be any evolution of hydrogen in the electrolysis of salts of copper, lead, &c., but the metals themselves would be deposited. If now, as I am disposed to think, this explanation is as consistent with the law so frequently alluded to already, as that put forward by Daniell, and since it renders unnecessary the assumption of so many hypothetical halogen substances, or compound anions, as that of Daniell presupposes, the advantage of the one over the other appears to be considerable, for it is one of the strictest rules of science to refrain from any extravagance of hypothesis and explanatory assumptions.

It has already been remarked that all dissolved oxygen salts, whatever may be their stochiometric composition, undergo electrolysis. I am on this account much inclined to believe that this remarkable fact must be regarded as an indication that in the electrolysis of oxygen salts there is no direct relation between the acids and the current, that they do not play the part of anion, and that only the bases are electrolyzed.

The haloid compounds, which in conformity with the older view I regard as substances containing oxygen, must of course be supposed to be electrolyzed in the same manner. The anhydrous chloride of hydrogen, chloride of potassium, &c. would be muriatic acid, muriate of potash, &c. In the electrolysis of the former the water would be decomposed, and the potash in that of the latter, while in both instances the chlorine, or peroxide of murium, evolved at the positive electrode would be a secondary product arising from the combination of ozonized oxygen there liberated, with the simultaneously liberated muriatic acid.

The hydrogen evolved at the positive electrode in the former instance I regard as the cathion of the electrolyzed water, while the potash and hydrogen which present themselves in the latter instance originate from a secondary action of the potassium upon water.

When the metal of a haloid salt does not decompose water it is separated from the water solution in the metallic state as in the electrolysis of muriate of oxide of copper (chloride of copper).

It is well known that many chemical compounds may be decomposed by the electric spark, and that for this purpose the liquid state is not an essential condition as in ordinary electrolysis. It is very generally considered that this mode of electric decomposition is in its immediate causal relations different from ordinary electrolysis, that is to say, that it is not a direct effect of electricity, but of the heat produced by it.

Two reasons have been assigned for this opinion; the fact that many compound substances are decomposed by heat precisely in the same manner as by electrical sparks, and further, the circumstance that in ordinary electrolysis the constituents of the decomposed substance present themselves separately, while in the decomposition by the spark they are mixed together.

Now, though it is true that in many instances substances which are decomposed by the electric spark may likewise be decomposed by heat, still this is not always

the case. However much hydrochloric acid gas may be heated it is never to any extent decomposed into hydrogen and chlorine, neither is carbonic acid decomposable in the same way into oxygen and carbonic oxide, while the electric spark decomposes both substances, at least partially. With regard to the decomposition of water by means of red-hot platinum wire, it is a question whether the metal does not exercise some influence as well as heat; for water has never to my knowledge been decomposed by any other red-hot substance besides platinum.

Although I will not attempt to deny that in many instances the electric spark causes decomposition in virtue of the heat which it produces, still I cannot perceive why this electricity should not be capable of effecting directly chemical decomposition.

All physicists hold the opinion, and with good reason, that ordinary electrolysis is the result of a direct action of the current, and that heat has no essential share in producing it. But as the current is nothing other than an electrical discharge equally with the spark there does not appear to be any reason why decomposition should not be effected by the one as by the other.

I am therefore inclined to believe that in regard to their immediate causation, there is no essential difference between the decomposition effected by the voltaic current and that effected by the spark.

Several physicists have proved that liquid water is decomposed by the electric spark, and in this case the constituents present themselves mixed, a circumstance which sufficiently distinguishes this decomposition from electrolysis.

Conformably with the view already put forward, I am disposed to conjecture that the decomposition of water effected by the electric spark arises from an allotropic state into which the oxygen is brought by the electrical discharge. This oxygen should, therefore, according to my view, be in the ozonized state at the moment of separation from its hydrogen. But since the electric spark deozonizes as well as ozonizes, since it produces water as well as decomposes it, there is no possibility of decomposing perfectly even a small quantity of water into ozonized oxygen and hydrogen by means of a continuous transmission of sparks.

Perfectly anhydrous chloride of hydrogen may be at least partially decomposed into chlorine and hydrogen. Now, since I regard chlorine as peroxide of murium, and anhydrous chloride of hydrogen as hydrated muriatic acid, it is necessary in this case to suppose that in the ordinary electrolysis of this substance the oxygen of its water is ozonized by the electric spark, and combines with the dehydrated muriatic acid, forming chlorine, while the hydrogen of this decomposed hydrate water is evolved.

This hydrogen cannot, for evident physical reasons, be transferred from one point to another, as in the ordinary electrolysis of water of hydrochloric acid, but can only be evolved at the spot where chlorine is formed.

Of course this mode of viewing the decomposition of water and hydrochloric acid by the electric spark, is likewise applicable to the decomposition of gaseous bromide and iodide of hydrogen, solid iodide of potassium, &c.

Many compounds are decomposed by the electric spark, but are not decomposed by either the voltaic current or the greatest degree of heat; for instance, carbonic acid, and in conformity with my hypothesis, the decomposition of this gas into oxygen and carbonic oxide must be regarded as the result of an ozonization of one half of the oxygen of the gas.

The reason why the voltaic current does not decompose this gas, may perhaps consist in the great difference between the intensity of the two kinds of electrical discharge, or in other words, in the circumstance, that with the spark, there is, within a given time, a greater quantity of opposite electricity equalized in a particle of carbonic acid than is the case in the action of the most powerful voltaic battery, and this is undoubtedly connected with the low conductibility of carbonic acid.

It is barely requisite to say that I extend my view respecting the immediate cause of the decomposition effected in oxidized compounds by the electric spark to the electrical decomposition of substances different in composition, and that I regard this decomposition as the result of an allotropic condition of one or other constituent of the substances.

Besides oxygen we are already acquainted with several other substances which are considered elementary, and which are capable of assuming different allotropic conditions; for instance, carbon, sulphur, selenium, phosphorus. It is indeed possible

that this character is one common to all simple substances. It is a remarkable circumstance, that the gaseous compounds of these substances with hydrogen are decomposed by the electric spark, and it is possible that this decomposition is the result of an allotropic condition induced in these elements by the spark directly or in a secondary manner by the heat produced.

(*To be continued.*)

SOME PHENOMENA OF CONTACT ACTION.

BY C. F. SCHÖNBEIN.

The author is of opinion that the decomposition of the peroxide of hydrogen, $HO+O$, by contact with various simple and compound substances, is owing to the conversion of the ozonized oxygen into ordinary oxygen, by the influence of contact with these substances, as well as by the influence of heat. Among the compound substances which decompose peroxide of hydrogen into water and ordinary oxygen, are those oxidized substances containing a metal as radical, and whose oxygen probably exists wholly or partially in the state of ozonized oxygen. Of the former kind are the oxides of the noble metals; of the latter kind are the peroxides of manganese, lead, cobalt, nickel, &c., as well as the oxides of iron and copper.

When air containing ozonized oxygen is shaken with a proportionately small quantity of any one of these oxides, the characters of ozonized oxygen disappear almost immediately. This cannot result from its combination with the oxide, for peroxide of silver, which is very effective in this respect, cannot combine with more oxygen; and therefore it must be inferred that this, as well as the other oxides mentioned, exercise an allotropant influence upon the ozonized oxygen, converting it into ordinary oxygen in the same way that they do the ozonized oxygen of peroxide of hydrogen.

Carbon likewise exercises a remarkable deozonizing influence both upon free ozonized oxygen and upon that of peroxide of hydrogen, which is decomposed by it, without formation of carbonic acid, into water and oxygen.

The decomposition of chlorate of potash, which the author regards as muriate of potash—chloride of potassium—combined with ozonized oxygen, by heat into chloride of potassium and oxygen, is therefore analogous to the decomposition of peroxide of hydrogen by the same means, and from this view the influence of the above-named oxides, in facilitating the decomposition of this salt, may be accounted for as the result of their influence in deozonizing the oxygen it contains.

Dobereiner was the first who observed that the presence of peroxide of manganese facilitates the decomposition of chlorate of potash, and subsequently Mitscherlich pointed out the analogy between the circumstances of the decomposition of this substance and peroxide of hydrogen.

Schönbein has found that all the above-named oxides exercise this influence in a marked degree, the only difference being that those containing easily reducible metals are themselves deoxidized, while this is not the case with the oxides of iron, copper, &c.

It should also be observed that in the presence of these substances there is no perchlorate formed, but that the decomposition of the chlorate is direct.

The influence of peroxide of iron is very remarkable: when chlorate of potash, mixed with a thousandth part of this substance, is heated to the melting point, a sensible evolution of gas takes place; with $\frac{1}{200}$ peroxide of iron, the evolution of gas is violent, and the whole mass becomes red-hot just before the decomposition is completed. This is the case, though in a less degree, even when only $\frac{1}{1000}$ peroxide is mixed with the chlorate.

When a very intimate mixture of chlorate of potash, with $\frac{1}{30}$ peroxide of iron, is heated at one point to the temperature at which the salt melts, the decomposition extends throughout the entire mass of the salt, and the evolution of gas is so violent that it borders upon explosion. It is worthy of remark, that in this rapid decomposition of the chlorate, the oxygen is mixed with noticeable traces of chlorine. —*Journal für prakt. Chemie*, lxv., 96.

PREPARATION OF ALUMINIUM FROM CRYOLITE.

BY HEINRICH ROSE.

Since the publication of Déville's method of extracting aluminium, I have endeavoured to obtain the metal, by means of sodium, from the double chloride of aluminium and sodium; not, however, following exactly the directions of Déville, but heating these substances placed in alternate layers. The result was unsatisfactory. Rammelsberg likewise, operating exactly in accordance with Déville's directions, obtained but a very inconsiderable product, and at the same time was seldom able to prevent the bursting of the glass tubes, in which the sodium vapour reacted upon the chloride of aluminium.

The use of chloride of aluminium and its compounds with the alkaline chlorides is particularly inconvenient, owing to their volatility and deliquescent character, which necessitate the exclusion of air during the reaction with sodium.

It therefore occurred to me to employ instead of chloride of aluminium, the fluoride of aluminium, or rather its compounds, with the alkaline fluorides, one of which, the fluoride of aluminium and sodium, occurs native in a state of great purity as cryolite. This substance is not volatile; it may be reduced to fine powder with great ease, is anhydrous, and does not absorb moisture from the air.

By heating powdered cryolite mixed with potassium to bright redness in a small iron crucible, I succeeded in obtaining aluminium with greater ease than from chloride of aluminium or its compound with chloride of sodium. I was, however, prevented by the scarcity of the mineral from continuing the experiments, until a short time since, when I received from M. Krantz, of Bonn, a considerable quantity of it, and likewise ascertained that it was to be had in large quantities at a very small cost.

A sample of a white powder was given to me, large quantities of which were introduced into commerce from Greenland under the name of "mineral soda," at a price of nine shillings a hundred-weight. It was used in the soap factories, where, by means of caustic lime, soda lye was extracted, which was peculiarly adapted for the production of certain kinds of soap, probably on account of its containing alumina. This powder proved to be cryolite.

Hitherto I have, in preparing aluminium, employed small iron crucibles $1\frac{3}{4}$-inch high and $1\frac{3}{8}$-inch diameter. The finely powdered cryolite was placed in layers with sodium, pressed down tightly, and covered with a thick layer of chloride of sodium.

I found chloride of potassium the most advantageous flux. It has a low density, and facilitates the fusion of the fluoride of sodium which is formed in the reaction.

The proportions were equal parts of chloride of potassium and cryolite, with two parts of sodium for five of cryolite.

The crucible was covered with a well-fitting porcelain lid, and exposed to a strong red heat for half an hour. The contents were then perfectly fused. When cold, the melted mass was immersed in water; and generally there was no evolution of gas, or at most it was very slight; and in those instances the hydrogen had the same unpleasant odour as that evolved during the solution of cast-iron in hydrochloric acid, the carbon originating from the minute quantity of naphtha adhering to the sodium used.

The melted mass softens very slowly, owing to the slight solubility of fluoride of sodium. This is somewhat lessened by the chloride of potassium. After about twelve hours the mass was crushed in a porcelain mortar, and the globules of aluminium separated. Their weight was from 0.3 to 0.4 or 0.5 grm.

The smaller globules could not easily be separated by levigation from the undecomposed cryolite and the alumina, which was always formed, on account of the greater hardness of these substances. This portion of the mass was treated with cold dilute nitric acid, which, though it did not dissolve the alumina, left the globules of the aluminium with a brilliant surface. After drying, the globules were separated from the alumina and cryolite powder by rubbing upon muslin.

Owing to the formation of an almost imperceptible film of oxide, which is formed upon them when heated, the small globules of aluminium require to be melted with a flux, in order to obtain a mass. There is always some loss in melting aluminium with chloride of potassium. A globule of the metal, weighing 3.85 grm., lost in this way 0.05 grm. The chloride of potassium did not contain any aluminium when dissolved in water, but a small quantity remained undissolved. There is no

doubt that a portion of the aluminium decomposed chloride of potassium, and that potassium and chloride of aluminium were volatilized, as is the case when copper and even silver are melted with chloride of potassium.

When the globules of aluminium were melted under the double chloride of aluminium and sodium, as recommended by Déville, the loss, if there is any, is very slight.

When the metal is melted under chloride of potassium, the surface is not perfectly even, but presents small indentations which is not the case when it is melted under the double chloride of aluminium and sodium.

The best method of preparing double chloride of aluminium and sodium is to place a mixture of alumina and carbon in a glass tube of considerable diameter, within which is a narrower tube containing chloride of sodium, and, while passing a stream of chlorine through the largest tube, to apply a very strong heat to that part containing the alumina and carbon, and a less heat to the part containing chloride of sodium. The vapour of chloride of aluminium thus formed is absorbed so readily by the chloride of sodium, that scarcely any is deposited at other parts of the apparatus.

Several modifications of the preparation of aluminium were tried, but the one described was found most advantageous.

When the sodium was placed at the bottom of the crucible, above it the cryolite powder, and then the chloride of potassium, much of the sodium escaped in vapour, which was not the case when the sodium was cut in thin slices and placed in layers with the cryolite.

After the crucible begins to be red-hot, it suddenly becomes intensely so when decomposition takes place. The heat must not be lessened then, but maintained for half an hour only. If continued for a longer time, the reaction of chloride of potassium upon the aluminium would cause loss. Neither were the globules of aluminium larger when the heat was maintained for two hours. That is the case only when a very intense heat is employed.

When the heat is discontinued after five or ten minutes the yield of aluminium is remarkably small, because the metal is then pulverulent, and burns while the crucible cools.

No larger product was obtained when the cryolite powder was mixed with an equal quantity of chloride of potassium, or when the layers of sodium and cryolite were covered with double chloride of aluminium and sodium.

The use of chloride of sodium as a flux necessitates a higher temperature, but the result is not sensibly different.

The yield of aluminium, obtained when the operation was conducted in the manner described, was very variable. It never amounted to the whole of the metal in the cryolite used. This substance contains only 13 per cent. of aluminium. The largest quantity obtained from 10 grms. of cryolite was 0.8 grm., frequently only 0.3 grm.; and less was obtained, iustead of the 1.3, which, by calculation, it ought to yield, if the reduction was complete.

The most important condition to which these variations must be ascribed is the temperature. The higher it is, the more does the aluminium aggregate into globules. I once succeeded in obtaining almost the whole of the reduced aluminium in one button, weighing 0.5 grm.

There is also a great loss of aluminium caused by the slow cooling of the melted mass and the burning of the pulverulent metal. In order to obviate this another mode of preparation was adopted. The cryolite (20 grm.) was ignited strongly in a gun-barrel, through which was passed a stream of hydrogen, and then the vapour of 8 grm. of sodium. The contents of the tube were cooled in an atmosphere of hydrogen, and when digested with water, to dissolve the fluoride of sodium, left a quantity of a black powder consisting chiefly of iron.

The small product obtained in these experiments should not deter others from further attempts to prepare aluminium from cryolite. This substance can now be obtained at such a low price, and sodium is likely to be obtained so cheap, as to render desirable the search for a method that will ensure an adequate product. Moreover, I am of opinion that cryolite is better adapted for the preparation of aluminium than any compound of this metal.

Aluminium has not yet been obtained with certainty direct from alumina. Potassium and sodium appear to effect the reduction of metallic oxides only when the potash or soda produced can combine with the unreduced oxides. Pure potash or soda, the characters of which are as good as unknown, do not appear to be formed. Now, as

alumina combines readily with the alkalies forming aluminates, there is reason to believe that the reduction might be effected by the alkaline metals.

Even if this should prove to be the case, cryolite would in all probability be for a long time the more available source of aluminium, unless it increased very much in price. This mineral occurs in a state of singular purity, and contains, besides aluminium, only fluorine and sodium, substances which do not interfere with the preparation of the metal. Alumina, on the contrary, is rarely found pure, and its separation on a large scale, from substances that would be prejudicial to the production of the metal, would be attended with great difficulties.

The globules of aluminium that I have obtained are for the most part so malleable, that they may be flattened out and rolled into foil without rending at the edges. They have a strong metallic lustre. Some pieces, on the contrary, which were found at the bottom of the crucible, sometimes firmly attached to it and not globular, rent at the sides when flattened. They also differ somewhat in colour and lustre. They are evidently not so pure as the majority of the globules, and probably contain some iron.

A large globule of aluminium, weighing 3.8 grm., appeared when cut through to be distinctly brittle, for about half a line from the exterior, while the inner part was soft and malleable. Sometimes there were cavities inside the globules.

Déville has obtained aluminium in a crystalline state, and I have likewise observed this in some instances. One large globule had quite a radiated crystalline structure at the part which was lowest during the cooling. Déville is of opinion that he has obtained octohedrons; but, according to the examination of my brother, the crystalline structure does not appear to be that of the regular system.

In an attempt to melt, without any flux, a somewhat impure globule of aluminium which had been flattened, small globules were protruded from the surface. The impure metal being least fusible, the pure metal mixed with it melts, expands, and is forced out of the mass, as is the case with impure bismuth.

I have already remarked that cryolite is used in Berlin, under the name of "mineral soda," for the preparation of caustic soda lye. Powdered cryolite is perfectly decomposed when heated with caustic lime and water at the boiling point. The fluoride of calcium produced does not retain any aluminium, the whole of which is dissolved as alumina by the soda, which, on the other hand, is free from fluorine, or contains only very minute traces of it.—*Annalen der Physik und Chemie*, August, 1855.

ON THE POSITION OF ALUMINIUM IN THE VOLTAIC SERIES.

BY CHARLES WHEATSTONE, ESQ., F.R.S.

Having, through the kindness of Dr. Hofmann, been permitted to examine a specimen of aluminium prepared by M. Claire-Déville, I availed myself of the opportunity to ascertain one of the physical properties of this extraordinary metal, which it does not appear has been yet determined, viz., its order in the voltaic series. The following are the results of my experiments.

Solution of potass acts more energetically and with a greater evolution of hydrogen gas upon aluminium than it does on zinc, cadmium, or tin. In this liquid aluminium is negative to zinc, and positive to cadmium, tin, lead, iron, copper, and platina. Employed as the positive metal, the most steady and energetic current is obtained when it is opposed to copper as the negative metal; all the other metals negative to it which were tried became rapidly polarized, whether above or below copper in the series.

In a solution of hydrochloric acid aluminium is negative to zinc and cadmium, and positive to all the other metals above named. With this liquid also copper opposed to it as the negative metal gave the strongest and most constant current.

Nitric and sulphuric acids are known not to act chemically in any sensible manner on aluminium. With the former acid diluted as the exciting liquid aluminium is negative to zinc, cadmium, tin, lead, and iron. The current with zinc is strong; with the other metals very weak, and it is probable that their apparent negative condition is the result of polarization. When aluminium is immersed in dilute sulphuric acid, this metal appears negative to zinc, cadmium, tin, and iron; but with lead, on which sulphuric acid has no action, the current is insensible. In both these liquids copper and platina are negative to aluminium, and notwithstanding

the apparent absence of chemical action on the latter metal, weak currents are produced.

It is rather remarkable, that a metal, the atomic number of which is so small, and the specific gravity of which is so low, should occupy such a position in the electromotive scale as to be more negative than zinc in the series.—*Proceedings of the Royal Society*, vol. vii., No. 12.

NOTE ON THE PREPARATION OF CALOMEL IN THE WET WAY.

Muck and Zinkeisen* have described experiments, which they consider to prove that the method of preparing calomel, recommended by Wöhler,† is defective, in as much as only half of the chloride of mercury is converted into calomel, unless an alkaline sulphite is used for the purpose; and that then there is a disadvantage, arising from a partial reduction of the mercury, which gives the calomel a grey colour.

Sartorius,‡ however, has made some further experiments on the subject, in consequence of the advantages that such a mode of preparing calomel would possess; and he has come to the conclusion that the method is fully capable of practical application, and that without the use of alkali, chloride of mercury may be almost perfectly converted into calomel by means of sulphurous acid, provided the solution has a certain degree of dilution.

Thus, for instance, chloride of mercury dissolved in 8000 times its weight of water, the solution saturated with sulphurous acid, and kept for some time at a temperature of from 158° to 176° F., yielded 84.6 per cent. calomel. According to calculation, the quantity should be 86.9 per cent., so that the deficiency is not greater than that experienced in the preparation of calomel by any other method.

The reaction between the chloride of mercury and sulphurous acid is not instantaneous, but gradually progressive; so that the calomel should not be separated from the liquid until some time has elapsed.

In the preparation of calomel by this method, on the large scale, the mercury which remains in solution may be recovered after separating the sulphurous acid from the solution, by precipitation with soda or an alkaline sulphide.

The calomel thus prepared is always crystalline.

"OL. HYDR. GALL."§

Under this designation, a compound for which the following is the formula, has been recently prescribed as an ingredient in ointments:—

℞ Hydrargyri nitrico-oxydi pulverati,
Acidi gallici āā. ʒss.
Olei olivæ fʒiss.

Rub well together [with a few drops of water] until the gallic acid and nitric-oxide unite forming a dark brown powder, when add the oil.

METHOD OF PREVENTING INCRUSTATION OF BOILERS.

A patent has been taken out in France by M. Duclos de Boussois for a method of preventing the incrustation of boilers.

The water with which the boiler is supplied is previously mixed with a solution containing

Chloride of barium	125
Hydrochloric acid, 1.20 s. g.	25
Water	450

generally in the proportion of volume of about 1.5 per cent.

The principle of the method consists in the decomposition of sulphate of lime, and formation of sulphate of baryta, and in the decomposition of carbonate of lime by

* Wittstein's *Vierteljahrschrift*, iv., 373.
† *Pharmaceutical Journal*, xiv., 470.
‡ *Annalen der Chem. und Pharm.*, xcvi., 335.
§ We presume this term is intended as an abbreviation for *Oleum hydrargyri gallatis*, i. e. *Oil of gallate of mercury*, but we doubt whether a gallate of mercury is the compound produced.

hydrochloric acid; while in both reactions there is formed chloride of calcium, a salt which does not produce incrustation. After the addition of the acid liquid the water is allowed to become clear in large reservoirs, and any excess of acid may be removed by introducing pieces of limestone into the tube by which it is conveyed to the boiler.—*Armengaud's Génie Industriel*, June, 1855, p. 337.

PIPITZAHOIC ACID.

Pipitzahoic Acid is the name given to a substance recently extracted by M. Rio de la Loza, Professor of Chemistry, of Mexico, from a root known in some parts of the Mexican republic as *Raiz del Pipitzahoac.** This root, specimens of which, together with the acid, were in the Paris Exhibition, is the produce of a compositous plant, probably, we are informed, of the genus *Trixis*. It is used in its native country as a drastic purgative, in the somewhat large dose of two or three drams. The acid is likewise purgative in a dose of from six to twelve grains.

The methods employed by M. de la Loza for the separation of the acid are sufficiently simple. The first is *by sublimation:* a quantity of the root in powder is mixed with an equal volume of sand and cautiously heated to a temperature not exceeding 176° F. The acid sublimes, and may be collected in the upper part of the vessel. A second method consists in pouring an alcoholic tincture of the root into water, when pipitzahoic acid (impure, we presume) is precipitated. A third process is that of allowing the alcoholic tincture to evaporate spontaneously, when the acid will crystallize out.†

Pipitzahoic acid has been investigated in the laboratory of Professor Liebig by Mr. Mason C. Weld.‡ This chemist describes the pure acid as readily soluble in absolute alcohol and in ether, from which it is precipitated upon the addition of water, in voluminous yellow masses. Upon evaporation of the alcoholic solution, the acid is found crystallized in tufts of lamellar crystals. Crystallized from ether, it forms small, shining, obliquely-rhombic tables. The acid has a golden-yellow colour, and is unchanged by exposure to the air. At about 212° F. it fuses, forming a red liquid, which, upon cooling, solidifies in a crystalline form: at a little over 212°, it sublimes unchanged, condensing in the form of golden-yellow scales.

Pipitzahoic acid, according to Mr. Weld, has a composition of $C_{30}\,H_{20}\,O_6$. Caustic and carbonated alkalies and the alkaline earths give, with solutions of the acid, an intense purple colour. The salts of the alkalies possess this characteristic colour; they are easily soluble in water, alcohol, or ether. Combinations of the oxides of copper, silver, and lead, with pipitzahoic acid have also been obtained.

The acid, it is thought, may be useful as a dye, and also as a chemical test for alkalies.

PURIFICATION OF SULPHURIC ACID FROM ARSENIC.

Dr. I. Löwe § calls attention to the fact, that in 1854 ‖ he proposed a method for separating arsenic from sulphuric acid, the principle of which is essentially the same as that of the method recently proposed by Buchner.¶ His method consists in heating the acid with a small quantity of chloride of sodium, and he considers this plan to be more practically advantageous than that adopted by Buchner, of heating it with solution of hydrochloric acid, or passing the dry gas through the acid; inasmuch as

* The learned body in Mexico to whom the first account of this substance was submitted changed the name of the acid, in honour of its discoverer, from *Pipitzahoic* to *Riolozic*. As the former name is more in accordance with established custom, and as we find the acid described in Germany under that designation, we prefer it (barbarous though it is) to that proposed by the Mexican *savans*.

† *Catalogue des Produits Naturels, Industriels, &c., exposés dans la Section Mexicaine à l'Exposition Universelle de* 1855. Paris: 1855. Page 51.

‡ *Annalen der Chemie und Pharmacie*, August, 1855, p. 188.

§ *Annalen der Chemie und Pharmacie*, October, 1855.

‖ *Jahresbericht des Physikal. Vereins zu Frankfort o. M.*

¶ Dingler's *Polytechn. Journ.*, cxxxii., 205.

it is more expeditious, and does not involve either dilution of the acid, or the troublesome preparation of dry hydrochloric gas. Moreover, the separation of chloride of arsenic does not take place so readily when the sulphuric acid is diluted, and there is also a probability that the arsenic would be converted into chloride more readily by the hydrochloric acid generated by the reaction of the chloride of sodium and sulphuric acid, than by either the dry gas or a solution of it. Chloride of sodium may easily be obtained pure, and although its use for the separation of arsenic from sulphuric acid would be attended with the introduction of a small quantity of sulphate of soda, still, for the majority of purposes for which sulphuric acid would be required free from arsenic, the presence of this salt would be quite indifferent.

Dr. Löwe remarks, that he had long been in the habit of purifying, in this manner, the sulphuric acid employed for the preparation of hydrochloric acid, and that he has found the method perfectly successful.

NOTE ON THE TESTING OF SULPHURIC ACID.

Wittstock* finds that when concentrated sulphuric acid, containing a trace of selenous acid, is mixed with a few drops of solution of protosulphate of iron, a reaction takes place, exactly similar to that presented by acid containing one of the higher oxides of nitrogen. After a time, the purple colour at the boundary of the liquids passes into red, and the precipitated selenium falls to the bottom of the vessel.

NOTE ON THE DETECTION OF STRYCHNIA.

BY MARSHALL HALL, M.D., ETC.

The detection of strychnia as a poison is, at this moment, of deep public interest. When the *chemical* test fails, there remains, I think, another—the *physiological*. Having long studied the effects of strychnia on the animal economy (I have sent two papers on this subject to the Institute of France†), I am persuaded that these effects on the *most excitable* of the animal species are at once the most delicate and specific tests of this poison.

I have just performed two experiments, and only two, for want of materials for more.

I requested Mr. Lloyd Bullock, of Hanover Street, to dissolve one part of the acetate of strychnia in one thousand parts of distilled water, adding a drop or two of acetic acid.

I then took a frog, and having added to one ounce of water $\frac{1}{100}$th part of a grain of the acetate of strychnia, placed the frog in this dilute solution. No effect having been produced, $\frac{1}{100}$th of a grain of the acetate was carefully added. This having produced no effect, in another hour $\frac{1}{100}$th of a grain of the acetate was again added, making the $\frac{3}{100}$ths, or about the thirty-third part of a grain. In a few minutes the frog became violently tetanic, and though taken out and washed, died in the course of the night.

I thus detected, in the most indubitable manner, one thirty-third part of a grain of the acetate of strychnia. It appeared to me that had more time been given to the experiment, a much minuter quantity would be detectible.

I placed the second‡ frog in one ounce of distilled water, to which I had added the $\frac{1}{200}$th part of a grain of the acetate of strychnia. At the end of the first, the second, and the third hours, other similar additions were made, no symptoms of strychnism having appeared. At the end of the fifth hour, the frog having been exposed to the action of $\frac{1}{50}$th part of a grain of the acetate of strychnia, tetanus came on, and under the same circumstances of removal and washing, as in the former experiment, proved fatal in its turn.

---

* *Annalen der Physik und Chemie.*

† See the *Comptes Rendus* for June, 1847, and February, 1853.

‡ These frogs were not fresh from the pools.

I thus detected $\frac{1}{50}$th part of a grain of the poisonous salt by phenomena too vivid to admit of a moment's doubt, the animal, on the slightest touch, became seized with the most general spasmodic, or, rather, tetanoid rigidity. And this phenomenon, alternating with perfect relaxation, was repeated again and again.

As the nerve and muscles of the frog's leg, properly prepared, have been very aptly designated as galvanoscopic, so the whole frog, properly employed, becomes strychnoscopic.

In cases of suspected poison from strychnia, the contents of the stomach and intestines, and the contents of the heart, blood-vessels, &c., must be severally and carefully evaporated, and made to act on lively frogs just taken from the ponds or mud. I need scarcely say, that taken in winter the frog will prove more strychnoscopic than in summer, in the early morning than in the evening.

The *best* mode of performing the experiment also remains to be discovered, with all its details and precautions—an inquiry into which I propose to enter shortly. Meantime this note may not be without its utility.

Princes Street, Hanover Square, January, 1856.

Postscript.—I have repeated my experiment. I placed one frog, fresh from the pools, in an ounce of water, containing the $\frac{1}{50}$th part of a grain of the acetate of strychnia ; a second in the same quantity of water, containing the $\frac{1}{66}$th, a third containing $\frac{1}{100}$th, and a fourth containing $\frac{1}{200}$th. All became tetanic in two or three hours, except the third, which was a *female* (the others being males), which required a longer time.

The $\frac{1}{200}$th part of a grain of the acetate of strychnia is therefore detectible by means of this test conferred by physiology.

We now placed a male frog in $\frac{1}{400}$th part of a grain of the acetate of strychnia, dissolved in six drachms of water. In three hours and a half it became violently tetanic.

The fresh frog is, therefore, at this season, strychnoscopic of $\frac{1}{400}$th part of a grain of the acetate of strychnia, and probably to a much minuter quantity, which ulterior experiment must show.

In two other experiments, the $\frac{1}{500}$th and the $\frac{1}{1000}$th of a grain of the acetate of strychnine were detected.—*Lancet.*

January 7th, 1856.

CASE OF POISONING BY ESSENTIAL OIL OF ALMONDS.

This was a case of a man, aged about thirty-nine, whose mind had for some time been in an excited state. He appeared on the morning of his death in his usual health, and was met by his servant descending from his sitting-room. The servant, on passing into the room her master had just left, observed a tumbler and bottle on the table, and immediately afterwards heard a noise as of a person falling. Hastening down, she found her master insensible and groaning. He was carried to his room, and Mr. Wright, a surgeon in the neighbourhood, sent for, who found him insensible, breathing or gasping slowly. Mr. Wright used some remedial means, but death took place in a few moments. It was estimated that ten minutes had elapsed from the time the dose was taken.

The body was examined about fifty-four hours after death. There was no smell of prussic acid, but on cutting through the abdominal walls, the previously absent smell of oil of bitter almonds was manifested. The stomach was removed with a portion of œsophagus and duodenum. On laying this organ open, it was found to contain ten drachms by measure of a semi-transparent oily liquid, which contained some albuminous-like flakes, and emitted an intensely powerful smell, as above mentioned. The stomach itself was large and capacious, contained no food, and its surface was of a bright chocolate-brown colour, covered with large deep rugæ. The mucous membrane was softened. The whole appearance conveyed to the mind the impression that it had been acted on by a powerful irritant. The other organs, so far as examined, were found to be healthy.

The ten drachms of fluid were analyzed by Mr. Redwood, and found to be pure essential oil of almonds, each drachm of which contained 3.42 grains of anhydrous prussic acid ; consequently, about 35 grains of this poison were removed from the

stomach; and it is probable, allowing for waste, that half as much again had originally been swallowed.

The point of especial interest in the case, was that so large a quantity of prussic acid could be swallowed, and admit of the patient walking down stairs. Dr. Quain believed that the protracted effects were due, in the first place, to the oily character of the medium, probably preventing rapid absorption; and, secondly, to the irritating character of the essential oil. He also remarked on the risk attending the common use of the essential oil of almonds. The subject of this case had, by his position in business, the means of getting free access to this agent, for the purpose of flavouring, and the bottle containing it was labelled "Essence of Bitter Almonds," though it was really the essential oil. He thought it ought to be known that this article could be had deprived of prussic acid, yet retaining its flavouring properties.*

POPULIN.

The crystalline substance, obtained by Bracconot in 1830, from the bark and leaves of *Populus tremula*, consists of

							Calculation.
Carbon	56.49	.....	56.49	.....	56.36	.....	56.34
Hydrogen	6.39	.....	6.13	.....	6.29	.....	6.10
Oxygen	37.12	.....	37.38	.....	37.35	.....	37.56

And its composition may be represented by the formula $C_{40}\ H_{26}\ O_{20}$, or by $C_{40}\ H_{22}\ O_{16} + 4\ HO$; since by heating at 212° F., it loses 8.43 per cent. water; and four equivalents HO correspond with 8.45 per cent.

Dilute hydrochloric acid dissolves populin, and at 212° F. decomposes it, forming, together with benzoic acid and grape sugar, a resin which melts in boiling water, and has all the characters of saliretin. When populin is heated with a mixture of sulphuric acid and bichromate of potash, it evolves hydruret of salicyle, which is inconsistent with the view that populin is a conjugate compound of saliretin, grape sugar, and benzoic acid. Piria† considers it to be a compound of saligenin, grape sugar, and benzoic acid; and that the saligenin separated in its decomposition is resolved by the further action of acids into saliretin:

$$\underset{\text{Populin}}{C_{40}\ H_{22}\ O_{16} + 4\ HO} = \underset{\text{Benzoic acid}}{C_{14}\ H_6\ O_4} + \underset{\text{Saligenin}}{C_{14}\ H_8\ O_4} + \underset{\text{Grape sugar}}{C_{12}\ H_{12}\ O_{12}}$$

Under the influence of decomposing casein, at a moderate temperature, and in contact with carbonate of lime, populin is decomposed with production of saligenin, lactic acid, and benzoate of lime.

Among the three substances supposed by Piria to exist in populin; saligenin and grape sugar have been recognized as constituents of salicine; so that there was reason to suppose populin might be converted into salicine by separation of the benzoic acid. This was found to be the case when populin is boiled with baryta water or milk of lime. In order to obtain the salicine, the benzoic acid is precipitated by means of perchloride of iron, excess of iron removed by lime, and excess of lime by carbonic acid. The liquid then yields salicine on evaporation.

Piria found the quantity of benzoic acid yielded in this way to be 28.90 per cent. This corresponds with the view he holds of its composition, which would require 28.68 per cent.

The salicine thus obtained is identical in all respects with the natural salicine, its composition being represented by the formula $C_{26}\ H_{18}\ O_{14}$.

The conversion of populin into salicine may be effected even by heating it with an alcoholic solution of ammonia to 212° F.

Weak nitric acid acts upon it only at 212° F., forming a yellow solution which, after long boiling, evolves vapour having the odour of hydruret of salicyle. When heated with ordinary nitric acid, populin is probably converted into nitrobenzoic acid and oxalic acid.

By the action of nitric acid, 1.30 s. g., populin is converted into a substance which Piria calls benzohelicin. This substance has great analogy with helicin; it crystallizes in silky needles; sulphuric acid dissolves it with yellow colour, and the solution, when diluted with water, evolves hydruret of salicyle. The same substance

---

* See *Pharmaceutical Journal*, vol. xiii., pages 277 and 597.

† *Il nuovo Cimento*, i., 198, and *Ann. der Chem. und Pharm.*, xcvi., 375.

is formed by boiling with hydrochloric acid with separation of benzoic acid. In the cold, caustic alkalies do not alter benzohelicin, but at 212° F. it dissolves with intense gold yellow colour, yielding the same products, together with grape sugar, when the alkaline solution is neutralized by an acid.

The constitution of this substance would appear therefore to be analogous to that of populin. Its composition isr epresented by the formula $C_{40}\ H_{20}\ O_{16}$; by heating it does not lose water. The above decomposition may be represented by the equation:

$$\underset{\text{Benzohelicin}}{C_{40}\ H_{20}\ O_{16}} + 4\ HO = \underset{\text{Benzoic acid}}{C_{14}\ H_6\ O_4} + \underset{\text{Hydruret of Salicyle}}{C_{14}\ H_6\ O_4} + \underset{\text{Grape sugar}}{C_{12}\ H_{12}\ O_{12}}$$

Benzohelicin may be converted into helicin by boiling with a base that abstracts benzoic acid without acting upon helicin.

THE ROYAL INSTITUTION.

The Friday Evening Meetings of this Institution were re-commenced on the 25th of January. The company was no less numerous and distinguished than that which has usually assembled on similar occasions, although the usual great attraction of the first evening of the season, a lecture by Professor Faraday, was not presented. The evening was occupied by Mr. Grove, who delivered a discourse on "Inferences from the Negation of Perpetual Motion." The lecturer referred to the various attempts which have been made to discover an inexhaustible source of motion, and the speculations of philosophers with regard to the possible result of such attempts. He explained his views upon the subject, which accord with those generally entertained, and he illustrated the admitted fact that every manifestation of power is attended with an expenditure of force, by several experiments, one of which was new. Faraday, who was present, will deliver a discourse on Friday, the 22nd of February, but the subject of his communication has not been announced.

REVIEWS.

CHEMISTRY IN ITS APPLICATION TO PHYSIOLOGY AND THERAPEUTICS.

BY DR. MIALHE.*

The work before us brings with it the recommendation of a well-known name and an attractive title. Its design is to show how far the various changes constituting what is called Life, may be attributed to definite chemical reactions, reactions as certain, as well determined, and as clearly demonstrated as the operations of the laboratory. Viewed in this light, the word *vital* is exchanged for the term *chemical* phenomena; the task of the author being first to assert their right to the appellation and then to explain the laws in obedience to which they act. Two objections instantly suggest themselves, the one imaginary, the other real. Are we to suppose (it will be urged) that the same mutual decompositions as are observed in the lecture-room actually take place in the human frame? Is not this altogether to lose sight of those modifying influences that must exist in the body? No, certainly, for as in elementary chemistry no one would describe phenomena irrespective of attendant circumstances, so none but the superficial would imagine the same transformations occurring in man as in a retort; but we are not on that account ignorantly to shrink back from the attempt to discover what is the special chemistry of existence, what is the action of the controlling energies of vitality, and what the ultimate result determined by these characteristic forces?

The second objection is the danger arising in all such speculations, of denying, making light of, or passing by unacknowledged the first cause of life itself, and great as must be the admiration excited by this treatise, the reputa-

* *Chimie appliquée à la Physiologie et à la Thérapeutique.* Par M. le Docteur Mialhe, Pharmacien de l'Empereur. Paris, 1856.

tion of Mialhe would not have suffered had his opening statements contained one line of recognition of that higher power which is beyond the grasp and above the comprehension of even "the Pharmacien to the Emperor."

The following sketch will give some idea of the intention of the volume:—There are two fundamental conditions of life, Oxydation and Nutrition, or, in other words, air and food. The phenomena of Oxydation take place wherever the blood penetrates after its absorption of Oxygen. Some substances are directly oxygenated, such as alcohol, the volatile oils, and albumenous bodies; some indirectly, as the neutral hydrocarbons (Glucose and Fatty Matters), which do not absorb Oxygen, save under the influence of the alkaline fluids of the system; while some resist its action altogether, as Gum and Mannite. Whatever momentarily interferes with Oxydation must be dangerous, whatever does so permanently, fatal. Chloroform and Sulphuric Ether act by displacing the Oxygen of the blood and arresting its combustion. Hence the most rational way to counteract asphyxia resulting from anæsthetics, is to inhale Oxygen. Hydrocyanic acid annihilates the intra-vascular combustion, and produces instant death.

But whilst Oxygen is a destructive agent, the functions of Nutrition are constantly repairing the waste of Respiration. The substances necessary to be assimilated undergo peculiar transmutations by means of the Saliva, the Gastric juice, the Bile, &c. These changes (as Dumas has shown) are purely chemical, and constitute what is called Digestion.

The alimentary substances have been divided by Prout into three classes:—1. Vegetable matters, or hydrocarbons—Sugar and Starch. 2. Nitrogenous bodies—Albumen, Fibrine, Gelatine, and Gluten. 3. Fatty matters—Fats and Oils. The first class are assimilated by means of the active principle of the Saliva, Diastase, which converts the starch into Dextrine, and finally into Glucose. Diastase is found also, though in lesser quantity, in the Pancreatic juice; and so powerful an agent is it, that one part by weight is sufficient to liquify and convert into dextrine and glucose more than 2000 parts of fecula.

From regular chemical deduction it is shown, that Glucose is in its turn decomposed by the alkalies of the blood, becomes transformed into new substances alone capable of absorbing oxygen and combining with it; it then undergoes a veritable combustion.*

Shall we turn aside for a moment from theory to a great practical result? It will be found in the treatment of Diabetes, that disease of hope against hope, with its unnatural thirst and consumptive weakness. Here the Glucose is *not* decomposed, but unassimilated is rejected by the secretions.

The cause of this disturbance is the want of sufficient alkalinity—the remedy is to restore what is deficient. Give alkaline carbonates, *Eau de Vichy*, Bicarbonate of Soda, and recommend moderate exercise, and open-air employment. One successful attempt to cure what has often been the incurable will prove, that the most practical men are those who are not afraid to speculate with sense.

Having ascertained the nature of the Saliva, the influence of the Gastric juice comes next under consideration. This, too, furnishes an active principle—Pepsine. By its means Albumen, Caseine, Fibrine, Gelatine, and Gluten are assimilated. Pepsine, therefore, is a functional agent as old as the first man, and has now the honour of adorning an advertisement as a patent medicine.

PEPSINE.

"The method pointed out by Vogel for obtaining Pepsine is the following:—Take the mucous membrane of a pig's stomach, cut it in little bits, and wash with cold

* Ainsi, la glycose n'a point la propriété de s'unir directiment à l'oxygène, elle doit être décomposée, transformée en substances nouvelles, qui seules sont propres à absorber l'oxygène, à se combiner avec lui; et ces transformations ne peuvent avoir lieu que sous l'influence des alcalis libres, ou carbonatés.—Page 66.

distilled water. After twenty-four hours' contact, decant and pour a fresh quantity of water on the pieces. This operation is repeated several days, until a putrid odour is discernible. The watery infusion thus obtained is precipitated by Acetate of Lead. The white flocculent precipitate which results contains Pepsine, together with much albuminous or caseine matter. This precipitate, well washed, is suspended in water, through which is passed a current of Sulphuretted Hydrogen. On filtering the liquid the caseine matter remains on the filter with Sulphuret of Lead, whilst the filtrate contains the Pepsine with Acetic Acid. By adding to the filtered liquor a sufficient quantity of absolute alcohol an abundant whitish precipitate is obtained, which is dried in the air—this is Pepsine. It must undergo two or three fresh watery solutions, filtrations, and alcoholic precipitations, in order to obtain it in a purer state and free from Acetic Acid."—Mialhe, *Chimie Appliquée*, page 100.

Pepsine has no action on Starch; it coagulates milk and the albumenous substances in general in the presence of a slight proportion of acid, dissolves this coagulum, and transforms it into *albumenose*, which bears the same relation to albumenous bodies as Glucose to the Starches.

Pepsine possesses also this well-marked chemical characteristic, that it is destitute of transforming agency apart from the previous action of an acid. This acid is furnished by the Gastric juice, and has been maintained to be Acetic, Butyric, Lactic, and by Prout, Hydrochloric acid; perhaps, indeed, it may be a combination of them all. Its function is, to convert albumenous substances into a gelatiniform mass. This mass is then acted upon by Pepsine, rendered soluble and capable of assimilation, the ultimate result being in all cases *Albumenose*.

The morbid conditions of Albumen, as seen in Cholera, or Bright's Disease, as well as the action of Albumenose, in its healthy functional state, are accurately delineated by Mialhe, but belong more to the Physician than the Chemist; yet, let it always be recollected, that it is the latter who has been able by his art to point out a rational mode of practice.

Unhappily, the exact method of the assimilation of the last class, the Fatty Matters, has not been satisfactorily determined. The Bile was formerly considered the principal agent. M. Bernard has announced a peculiar active principle which would complete the series, but Mialhe gives his reasons for rejecting it. The present idea is, that these bodies are converted into emulsions by means of the alkalies of the Pancreatic juice, and in that state are capable of assimilation; whilst from the experiments of Matteucci it follows, that Fatty Matters, to become capable of absorption, should not only be in a state of emulsion, but should likewise have an affinity for the liquids impregnating the organic membranes. It will be unnecessary to linger over a theory adopted by Mialhe with regret to be abandoned at the first sign of a better one.

These general and important considerations lead to the great doctrine of Absorption. From the anatomical structure of the vessels of circulation all absorption must be endosmotic; consequently, nothing but substances in a liquid or gaseous state can penetrate; hence those solids, which do not come under the influence of agents capable of liquifying them, are *not* absorbed, according to the old axiom, *Corpora non agunt, nisi soluta.*

Solids, contrary to the opinion of Orfila and Œsterlen, are rendered active in proportion as they are rendered soluble. Not only should substances be liquid, but they should retain this liquid state while in the organism; for if they combine with the membranes, or form an undissolved coagulum, they become unfitted for absorption. At this point Mialhe relinquishes theory and commences at once an intelligent examination of several well-known bodies, points out their action, and gives a practical insight into the real value of Chemistry in its association with Therapeutics.

Carbon meets with little favour, for there is nothing in the body capable of effecting its solution; its action, therefore, such as it is, is purely mechanical, and must remain so until some experienced Chemist can exhibit it in

a soluble form. But Sulphur surely must share the same fate, since common opinion considers it insoluble, yet the experience of every day demonstrates its medicinal value. All are aware that persons under its influence cannot rid themselves of its pervading odour, and that it even blackens any metallic substance they may wear. The truth is, as the theory would induce one to suspect, that it *is* soluble in the alkaline carbonates of the liquids of the digestive tube, and is transformed partly into Sulphuret, partly into alkaline Hyposulphite. If this be true, Sulphur should be poisonous to animals the juices of whose digestive organs are naturally alkaline; and so it is, 500 grammes are a poison to a horse. This leads to what Mialhe calls a Rational Formula; that is, one based on ascertained chemical facts. If Sulphur becomes absorbed by means of alkalies, the best thing is to prescribe it in association with them;

℞ Sulphur. Loti, ʒiv.
Magnes. Carbon., ʒiv.
M. in pulveres xviij. divide—j. quotidie sumend.

A good illustration is afforded by the success of the celebrated compound—

POMMADE D'HELMERICH.

℞ Sulphur. Sublimat., ʒv.
Potassæ Carb. Exsiccat., ʒiiss.
Adipis Suillæ, ℥iiss. M.

This portion of the subject is so multifarious, that a few selections of opinions, especially belonging to Mialhe, must suffice. Shades of Orfila! Arsenic is not poisonous in a metallic state, nor is it so, until by the absorption of Oxygen (favoured by the presence of an alkaline chloride) it is transformed into Arsenious Acid. Neither are the natural Sulphurets of Arsenic (Realgar and Orpiment) poisonous in themselves. This remark does not apply to these compounds as found in commerce, which contain an enormous quantity of Arsenious Acid. The harmless character of the native Sulphurets has an important result, namely, that the Hydrated Sulphuret of Iron is the best antidote in case of poisoning by Arsenic, as well as in poisoning by the salts of Tin, Lead, Copper, Antimony, Bismuth, Mercury, Gold and Silver, whose deleterious action it annihilates.

HYDRATED SULPHURET OF IRON.

"The antidote to all metallic poisons (with the exception of Cyanide of Mercury) is the Hydrated Sulphuret of Iron. Having no deleterious action itself, it precipitates Arsenious Acid, the salts of Zinc, Tin, Lead, Bismuth, Antimony, Copper, Mercury, Silver, Gold, and Platina, in the state of insoluble Sulphuret. All Chemists' shops should constantly keep on hand a substance capable of neutralising so many poisons, and that in so complete a manner. It is obtained easily, and in any quantity, by precipitating a solution of a salt of protoxide of Iron by an alkaline protosulphuret in solution. Care must be taken to wash the precipitate with distilled boiling water, and to keep it from exposure to the air.

"Let us add, that when it is associated with Calcined Magnesia, a combination which we were the first to propose (and the advantages of which have been fully set forth by M. Duflos), it can be used as a counter-poison to all the acids, to the compounds of Cyanogen, and even to the Cyanide of Mercury; that is to say, that it then constitutes the counter-poison *par excellence*, a veritable general counter-poison."—Mialhe, *Chimie Appliquée*, page 538.

The peculiar action of Alum is remarkable. In small doses it coagulates and is astringent; in large doses the coagulum is dissolved, and Alum so administered renders all the albuminous matters that it meets with more than ordinarily fluid. Without the knowledge of this fact, the Chemist or Physician might in their anxiety to hasten a result, take the surest method of preventing it.

An elaborate notice is bestowed by Mialhe on Magnesia, Iron, and Mercury. Three kinds of Magnesia are described:—the Calcined variety of the Codex,

which is soluble in weak acids, and very soluble in concentrated ones; its distinctive character is, that when *recently* calcined it remains fluid in water, but that in twenty-four hours, on becoming hydrated, it forms a solid mass. The second variety is a Hydrated Magnesia of English manufacture, not carbonate, very light, very soluble in acids, and remaining liquid in water. It loses on calcination twenty per cent. of water. The third variety is the well-known Henry's Calcined Magnesia, which is heavy, permanently liquid in water, scarcely soluble in weak, and sparingly soluble in strong acids. This Magnesia very slowly and very imperfectly solidifies the Balsam of Copaiva. Passing over all other details, three valuable hints have been pointed out by the chemistry of Magnesia:—1. A strong objection has been urged against it that it forms solid deposits in the system which often become dangerous. This may arise from its being administered in improper combinations, which produce insoluble salts. But it has been seen that Caustic Magnesia *naturally* solidifies on becoming hydrated, hence this variety should never be given in large doses, whilst the best and most reliable Magnesia, is one thoroughly hydrated. 2. Magnesia is soluble in acids, and is then capable of assimilation, hence the wisdom of exhibiting it with Sugar, part of which being converted into Lactic acid, greatly promotes its action. 3. In testing Copaiva, care must be taken in the choice of the kind of Magnesia used, Caustic Magnesia being the only one adapted for the prompt and complete solidification of the Balsam; many specimens of Copaiva, considered as bad (and rejected as such by purchasers) have been unjustly thought so, because the Magnesia employed in the analysis was hydrated, and consequently unfit for purposes of estimation.

A few scattered extracts would hardly do justice to the admirable sketch of the Iron series. Three general conclusions are, however, too interesting to be omitted:—1. All preparations of Iron (soluble, or capable of becoming so under the influence of the acids of the Gastric juice), susceptible of being decomposed by the alkaline substances contained in the blood, can be used with advantage in the treatment of organic affections which require the use of Iron. 2. All preparations of Iron (soluble, or capable of becoming so under the influence of the acids of the Gastric juice), *not* susceptible of being decomposed by the alkaline substances contained in the blood, can have no advantageous action in the treatment of organic affections which require the use of Iron. 3. Amongst the insoluble compounds of Iron used in medicine, simply divided Iron and the Carbonate of the Protoxide are the most reliable; and amongst the soluble compounds of Iron, there is none superior, if any equal, to the Ferri Potassio Tartras.

Mercury must be left with one remark. All mercurial preparations used in medicine produce during their stay in the human economy a certain quantity of Corrosive Sublimate, to which alone their therapeutic and toxicological effects are owing. Children, therefore, whose food contains little Salt, can bear a larger proportional dose of Calomel than adults.

Here these selections from the work must end, bearing in mind the ominous warning of the title-page—"The Author and Editor reserve to themselves the right of Translation." The last section, devoted exclusively to "Pharmaceutical Studies," would suffer by a too scanty notice. It is hoped, however, that enough has been advanced to show that the reader is in presence of an original thinker, with a fertile theme. In relation to subjects such as these, praise or blame would be equally out of place. Here are experimental facts produced and inferences drawn. If the facts can be shown to be incorrect or the inferences erroneous, no skill of a reviewer can save them from oblivion. The verdict rests with the future. The student at least should be grateful to Mialhe. In his hands Chemistry ceases to be a mere list of decompositions and affinities, learnt as a task, to be forgotten in disgust. In a moment it is a science instinct with interest; the abstract merges into the practical, and some of the strangest phenomena of life are explained. To those who deem such considerations

beyond the Druggist's sphere, we commend the careful reading of these pages —not in the cold formality of a correct translation, but in the expressive elegance of the original. Happy will be the event if it issue in a due appreciation of our friends on the other side the Channel, and in our being better able to assert our claims as competent, because Philosophic Chemists.

31, *Southampton Street, Covent Garden.* JOSEPH INCE.

BOOKS RECEIVED.

ON THE NATURE, TREATMENT, AND PREVENTION OF PULMONARY CONSUMPTION, AND INCIDENTALLY OF SCROFULA, *with a Demonstration of the Cause of the Disease.* By HENRY M'CORMAC, M.D. London : Longmans and Co. and J. Churchill ; Edinburgh: Shepherd & Co. and Sutherland & Knox; Dublin: Hodges & Smith ; Paris : J. B. Bailliere ; Leipsic : K. F. Kochler. 1855.

MEDICAL NOTES ON THE CLIMATE OF BURMAH, *and on the Diseases which have there prevailed among European Troops.* By CHARLES MURCHISON, M.D., &c., &c. Edinburgh : Printed by Neill & Co. 1855.

TO CORRESPONDENTS.

Mr. SOUTHALL has drawn our attention to the formula for Liquor Ferri Oxysulphatis, published in this Journal, vol. i., page 598, and the formula for the same preparation in Pereira's *Materia Medica*, where ounces instead of drachms of sulphate of iron are ordered. The formula in the latter work was taken from this Journal, and is clearly a misprint: the proportion originally ordered by Mr. Tyson being that which we have given, viz., *drachms*.

H. W.—*Iron alum.* See vol. xiii., pages 306, 404.

Excelsior (York).—Vol. vii., No. 7; the other information may be obtained on application by letter to the Secretary, 17, Bloomsbury Square.

H. B. (Southampton).—*Gingerine.* Vol. xv., page 192.

V. S.—By devoting the time not occupied in business to study and chemical experiments, followed by a course of practical instruction in a scientific laboratory.

D. (Flint).—Consult any elementary work on chemistry.

A Correspondent (Sunderland).—A knowledge of the Latin language is indispensable for a Pharmaceutical Chemist.

A. P. S. (Birmingham).—*Dispensers in the Army.* Application should be made to Dr. Andrew Smith, 13, St. James's Place, London.

A. C. (Mansfield).—*Dispensers in the Navy.* Apply to Sir W. Burnett, Navy Medical Department, Somerset House.

F. A. C. (Rochdale).—Fresenius's *Elementary Instruction in Chemical Analysis*, and Fownes's *Manual of Chemistry*.

E. W. (Brighton).—(1.) Liebig's *Annalen*.—(2.) *Journal de Pharmacie et de Chimie.*

J. O. (Dudley).—The price of the Journal is on the cover.

J. G. F. R. (Longton).—(1.) Fresenius.—(2.) Compound tincture of rhubarb of the London Pharmacopœia should be made by maceration.—(3.) A Chemist who is not a member cannot call himself "Member of the Pharmaceutical Society" without incurring the penalty provided by the Act.—(4.) We know of no cheaper method of making chloride of silver than the one generally adopted, of precipitating a solution of the nitrate by chloride of sodium.

Alpha (Settle).—When mercury and iodine are rubbed together, the chemical action is so violent as to cause an explosion; a little spirit is therefore added to moderate the action. In the case referred to the quantity of spirit used was not sufficient.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. SMITH, Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. CHURCHILL, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XV.—No. IX.—MARCH 1st, 1856.

LIMITED LIABILITY.

When the tide of public opinion or excitement takes a turn in any particular direction, it is not in the wit of man to guess where it will stop. Grievances are endured and abuses tolerated, from the force of habit; and when a remedy is suggested, people sometimes wonder they never thought of it before, and, over-estimating the value of the discovery, ride the hobby to death.

The plodding man of business toils from morning till night, invests his savings in the funds or some other security, yielding moderate but regular interest, and after many years of perseverance, attains the reward of his labour—namely, an independence. Circumstances, however, occasionally arise, which tend to throw into the shade the quaint notion that it is policy for every man to attend to his own business. The march of intellect, aided by the spirit of enterprise, creates from time to time fresh demands for capital, with the prospect of large returns; and the money market is continually fluctuating between the extremes of MANIA and PANIC, according to the progress—upwards or downwards—of whatever class of speculations happens to prevail. Canals, bridges, mines, lotteries, railroads, building schemes, gold diggings, banks, insurance offices, and cemeteries, succeed each other with a similar train of events, marking their progress from the golden dreams of promise to the more sombre and tangible result displayed in the balance-sheet. Rapid fortunes are made and lost, the rise and fall of the shares being often the effect, as well as the cause of the extent of the demand, and the result always leading sooner or later to the discovery of the inconvenient fact, that high interest is attended with risk—that the "royal road" to fortune has its liabilities as well as its gains.

In the scramble for wealth, which furnishes an illustration of the race between the hare and the tortoise, many simple-minded persons become the dupes of others, who, having originated schemes, watch the opportunity to sell out, leaving their victims to take care of themselves as well as they can. The partners in a venture are morally responsible for the fulfilment of contracts, entered into with a view to mutual advantage; but the legal principle of *joint* and *several* liability exposes some shareholders to individual attack, while others may escape unmolested. Justice, therefore, demands the amendment of the law, with a view of equitably distributing the liability of the parties concerned in such undertakings.

The Act passed last session was framed with this object; but the partial failure of the measure, as well as the difficulties attending the question, may be inferred from the renewal of the discussion at the present time, with proposals for a further amendment of the law. A great impulse has already been given to joint-stock speculations, and, as these appear to be daily increasing in number and variety, it is right to consider the probable tendency of this incipient mania, and the principle involved in unlimited trading on limited liability.

Joint-stock companies are not now confined to undertakings requiring a large amount of capital, and attended with more risk than individuals could encounter. There is no scheme, however visionary, requiring any amount of capital from thousands down to hundreds, which is not liable to be launched into the money market with the tempting superscription "limited liability." Inventions, patented or provisionally registered, are offered to the public in small shares, "limited." Milk, wine, beer, clothing, and other commodities, are drawn into the vortex of this "centralising" propensity, which appears to be extending generally in the various departments of retail trade. Banks are rising up like mushrooms; building societies and discounting (kite-flying?) companies swell the list of speculations; and almost every day exhibits the "limited liability" mania under

some new aspect. The Cosy Conveyance Company (limited) is projected "for the general abolition of the unwholesome and noxious omnibus, and the substitution of light, airy, well-ventilated, and rapid carriages," &c. The Patent Medicine Compounding Company (limited) "is formed for the purpose of working some very valuable patent medicines, and to establish a factory in London for compounding and sale wholesale, and for appointing agents in London, country, and abroad, for the sale thereof retail." This latter company will furnish unprecedented facilities for the introduction, puffing, compounding, and sale of *secret medicins*—a class of commodities which, in France and some other countries, are strictly prohibited by law, as being a cloak for fraud, and dangerous to the public health.

If we may judge from the symptoms which have already manifested themselves, there is every reason to anticipate, as the result of the increased facilities for scheming, a more than proportionate increase in the number, variety, and boldness of the schemers, and there is no less reason to fear that the present mania for "limited liability" will, unless it meet with a timely check, degenerate into a system of unlimited swindling.

It is also worthy of remark, that the joint-stock propensity may be carried to such an extent as to be suicidal in its tendency, and may actually impede instead of promoting the principle of free trade and the stimulus to individual industry. This may be made obvious by an illustration of the mode in which the principle would operate if applied generally to the ramifications of retail trade. A tradesman, having saved money, desires a good investment. He observes that his opposite neighbour (who carries on a different business) is also thriving. He attributes the circumstance to the lucrative nature of the business. *He is told* that the profits are twenty or thirty per cent.—on some articles fifty or more. He would consider ten or fifteen per cent. a very good interest on his surplus capital, and he sits down to calculate the probable dividend which might be obtained by forming a company on the limited liability principle, to carry on his neighbour's business. He fancies the margin between a handsome interest on surplus capital and the actual profit of a retail trade, would enable the company to undersell his neighbour, and thus insure the success of the competition. Encouraged by a few speculative friends and a provisional secretary, he launches his savings in the new venture.

While these arrangements are going on, a similar process of reasoning is in progress on the other side of the street. While he has been watching his neighbour's business, his neighbour has been watching his business; and a similar company is projected with a view of driving him out of the field, and converting his regular income into a dividend for the shareholders.

If these speculations should severally be attended with success, it can only be by substituting a joint-stock monopoly for the free trade of individual industry. But it is much more likely that the result would show the fallacy of estimating the profits of others by vague rumours, and omitting to calculate correctly the working expenses of the plant, the salaries of managers, the cost of experience in learning the business, the casualties of bad debts, and "sundry charges;" in which case, each of the neighbours might find himself disappointed of his dividend—probably minus his "limited" capital, and minus also the deficiency arising from the loss sustained in his regular trade during the continuance of the struggle, ruinous for the time on both sides. The convulsion which delusions of this kind, when carried to a foolish extreme, occasion in the money market, and their prejudicial influence on public confidence and credit, can only be cured by the process of actual cautery; for when a sufficient number of persons have "burned their fingers," a panic ensues, speculators find their level, golden dreams give place to stern reality, and the first symptom of a healthy reaction is the revival of the antiquated notion, that it is better for every man to attend more to his own business, and to interfere less with that of other people.

THE MEDICAL BILL FOR SESSION 1856.

This Bill is becoming milder by degrees. Its fangs have been extracted one at a time until the microscopic eye of the homœopath is required to detect anything dangerous in its tendency. It is now in effect a simple registration Bill, which will define the boundary of the Medical Profession, classify the members in England, Scotland, and Ireland respectively under the two heads, Physician and Surgeon, and prohibit, under a penalty (recoverable by an easy process of law), the fraudulent assumption of any medical name or title. The words in the definition clause, "medicine shall include Pharmacy," are not in the present Bill, and the 45th section states that "nothing in this Act contained shall affect the lawful occupation of Chemists and Druggists;" 46th, "nothing in this Act contained shall interfere with the privileges of duly licensed Apothecaries in Ireland." Several old Acts of Parliament which are obsolete or nearly so, are consigned to schedule A for total or partial repeal, as well as the following sections of the Apothecaries' Act 55 Geo. III., cap. 194, sec. 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24. These sections relate to the functions of the Society of Apothecaries as an Examining Body, and to the powers of the Society to recover penalties for illegal practice as an Apothecary. The sections unrepealed refer to the corporate privileges of the Society of Apothecaries, their jurisdiction over the members of their body, the mode of recovering penalties, and the exemption of Chemists and certain other bodies from interference.

The substitution of the principle of registration for the powers previously vested in the Master and Wardens of the Society of Apothecaries, will scarcely be palatable to the advocates of the stringent prohibition of medical practice by unqualified persons. Nevertheless, we are inclined to think the penalty for the fraudulent assumption of medical titles will be practically more efficacious than the power of prosecuting for illegal practice—a power never exercised except at the instigation of personal jealousy on the part of a rival practitioner, and generally frustrated on account of the extreme difficulty of obtaining the requisite evidence.

The discussion in the House of Commons on the second reading affords but little ground for believing that any very stringent measure would be entertained by the Legislature, for if Homœopathy is to be taken under especial protection, the claims of Hydropathy, Mesmerism, Coffinism, Vegetarianism, and other varieties of fanaticism could scarcely be disregarded. And if to the unlimited list of heterodoxies we add the "Quack Medicine Compounding Company," the only act recognized by the law as an offence against medical propriety will be that of sailing under false colours. Even this is a step in advance, as it has hitherto been lawful for any man to assume any title or status, to impose on the public to any extent, and by this means to evade the law with impunity, provided always that his practice was *strictly confidential*.

The want of a correct definition of the term "duly or legally qualified medical practitioner," was exhibited in rather a ludicrous manner at the recent election of a medical officer of health for a metropolitan parish. It was obvious that a Fellow or Licentiate of the Royal College of Physicians was duly qualified, and also that the double qualification of Surgeon and Apothecary was satisfactory, but it was doubted whether a Member of the College of Surgeons, not being a licentiate of the Society of Apothecaries, was legally qualified. It was also a question whether the licence of the Apothecaries was alone sufficient. Two or three of the candidates possessed a diploma of the College of Surgeons, and an Apothecary's licence to practise anywhere, *except* in London and within ten miles (this limitation of locality being dependent on the amount of fee). Another case which excited much speculation and argument, was that of a graduate of the University of Glasgow, but not a Fellow or Licentiate of the Royal College of Physicians. His absolute qualification and fitness for the

office being admitted by all parties, it was merely a question of legal technicality whether the want of a particular kind of licence was a legal disqualification. The 6th Geo. IV., cap. 133, was quoted in support of his claims, he having formerly officiated as Assistant-Surgeon in the East India Company's Service, which, in the above Act, is stated to give a qualification as an Apothecary. But here again two difficulties arose. In the document put in as evidence of his having so officiated, the term used was "Surgeon's mate," and it was questioned whether the term mate was identical with assistant; this doubt having been set aside, it was observed that the Act above referred to was passed "for one year," and has not been renewed. It was ultimately decided, upon a common-sense view of the case, supported inferentially or by implication by certain clauses in the Lunatic Act and other Acts, and the bearing of some of these clauses on others, and the bearing of the whole on the general issue,—that the said candidate, whose education and experience placed him in a distinguished position, and who is a Fellow of the Royal Society, was in law, as well as in fact, a duly qualified medical practitioner, and he was accordingly elected by a very large majority. Such a discussion, exposing as it did the absurd inconsistencies and confusion existing in the medical laws at the present time, afforded abundant evidence of the necessity of an amendment, even if it should go no further than to establish a register which should settle the boundary line by which all legally qualified medical practitioners may be identified. Mr. Headlam's Bill still contains the clause entrusting the proposed medical council with the duty of compiling the Pharmacopœia. We doubt the policy of this provision, as the existing arrangements for the publication of a joint Pharmacopœia by the three Colleges of Physicians, assisted by a Pharmacopœia Committee of the Pharmaceutical Society, will, we hope, supersede the necessity of any further change in the jurisdiction over the work. We subjoin the discussion on the second reading of the Bill, as reported in the *Times* of February 21st.

MEDICAL PROFESSION BILL.

Mr. HEADLAM moved that this bill be read a second time, with a view to being referred to a select committee.

Lord R. GROSVENOR said that by this bill no medical man would be able to recover costs of medical attendance unless his name was on the register, and the bill also provided that no person could hold an office in any public capacity, or in any hospital or infirmary, unless his name was upon the register. Every medical man must belong to some college, which had power to strike his name off the register. The bill thus gave a monopoly to the members of these colleges. It was all very well in the law to say that none but barristers and solicitors should practise, because law was an exact science compared with medicine. A recent case occurred in Edinburgh, where an examining body refused a diploma to a gentleman, otherwise qualified, because he refused to promise not to practise homœopathy. Now, the House ought to be aware that at this moment several hundred educated medical practitioners were practising homœopathy in this country who were as honest, as scientific, and more successful than the others (*a laugh*), but who would hereafter be liable to have their names struck out of the register, at the *dictum* of these bodies. The state of medical science in this country would not justify the House in giving them such large powers. One of the greatest writers on medicine, Dr. Forbes, said that the present state of medicine in this country required complete and entire revision. Yet by this bill it was proposed to give the medical bodies a complete and entire monopoly of practice. Dr. Chambers, a distinguished physician, speaking of Dr. Williams to an astonished auditory, said that Dr. Williams "had no confidence in medicine." It was said of another distinguished physician, that, at the close of his life, he used to declare he could not tell whether he had done more harm or good by his prescriptions. During the cholera season a commission was appointed to examine the progress and treatment of cholera in the metropolis. One of the commissioners thought it his duty to examine the Homœopathic Hospital in Golden-square. No one was more strongly prejudiced againt homœopathy than this gentleman. He saw the treatment; he said that all the cases were cases of real cholera, and he declared that the treatment was the most successful of any that he saw, and that if he

had the disease, it was to the treatment of this hospital that he should recur. (*Hear.*) Before the House consented to give such powers as this bill conferred, it ought carefully to consider whether great injustice might not be done to duly educated practitioners, and whether some modifications of the clauses would not be necessary. (*Hear, hear.*)

Sir G. Grey agreed with his noble friend that some of the clauses of this bill required very careful and attentive consideration. His noble friend did not appear to deny that some security ought to be taken for the examination of medical practitioners and the registration of those who were duly qualified; but as to the composition of the council and the mode of its election differences of opinion might exist, which might be fairly urged before the committee. The power of striking off a medical practitioner without some liberty of appeal might also be a proper subject of consideration. His noble friend said that these medical bodies would be able to interfere with those who practised homœopathy, but he doubted whether they could interfere if a particular course of treatment were found to be attended with beneficial results. Security ought to be taken against the capricious removal of any medical man from the register, and it was right that due caution should be taken against the undue exercise of power by the medical authorities. The bill had been circulated among the profession during the recess, and although it could not be said there was a general agreement in the details, yet there was a greater approach to an agreement than upon any bill that had yet been submitted to the House. He should therefore support the second reading.

Mr. Henley said that, remembering the improvements that had taken place in medical treatment, and the manner in which the older branches of the profession had set their faces against modern improvements, he thought it a dangerous power to enable the medical colleges to strike off a man's name for anything so indefinite as "misconduct," which might be immoral conduct or mere medical treatment. He had no sympathy with homœopathy, unless upon the principle that the less of a bad thing you took the better (*a laugh*), but he hoped care would be taken that there should be no interference with that freedom of practice which had hitherto been permitted in this country. (*Hear, hear.*) At the same time it was right that persons should not be let loose to practise without a certificate that they had been properly educated for the medical profession.

Mr. Headlam explained that the bill imposed no restrictions on persons who were not members of colleges which did not at present exist. They were left in precisely the same condition as at present. Whatever suggestions any of the learned bodies affected might have to make, he should be most willing to accept, and, in order that the bill might be fully considered, he should propose that it be committed on the second Wednesday after Easter.

The bill was then read a second time, and ordered to be committed on the 2nd of April.

PROFESSIONAL ETHICS.

Before any progress can be made in the endeavour to reduce to a tangible form the rules which ought to be observed by the members of our profession, it is necessary to consider the subject more in detail. We shall therefore give a few illustrations of the kind of practices which we consider unprofessional, and to which our observations of last month were chiefly directed.

We have before us a large and rather curious collection of puffs, a few of which will serve as specimens; but we purposely avoid mentioning names or addresses, or giving any clue which could lead to the identification of the parties by those who are not in possession of the documents themselves. Our object is to establish correct professional principles, not to attack individuals who, inadvertently or from any other cause, may have deviated from them. Our first illustration is a quack medicine called "Nervo-Arterial Essence," discovered and prepared by Dr. —— ——, Member of the Royal College of Surgeons, England, and Member and Licentiate of the Apothecaries' Company. The document proceeds to state that—

"All disease springs from the inadequate circulation of the nervous and sanguineous fluids—nervous power depends on the free and proper movement of the nervous fluids in and along the

nervous chords." "The nervo-arterial essence has a specific action on the nervo-arterial system"—it promotes cheerfulness, and is recommended for a long list of maladies, among which are melancholy, indigestion, loss of memory, headache, deafness, exhaustion, cough, bilious complaints, palpitation of the heart, blotches and spots in the face, cancerous affections, rheumatism, affections of children, &c.

This is followed by a list of cases.

The next specimen is a shabby little shop-bill, with the superscription MULTUM IN PARVO, of which it is said—"There is no medicine that can equal, for pleasantness and efficacy, ——'s Sarsaparilla Mixture." The list of disorders curable by it is, in its incongruity and extent, similar to the former specimen. Another bill by the same advertiser describes "a certain cure for a cough," and both documents contain the announcement—"Medical and surgical advice free; and patients visited by a qualified and talented surgeon without charge. Midwifery fee, 10*s*."

Our next is a fragment of a newspaper containing six separate advertisements by a "Pharmaceutical Chemist." Three of these describe the virtues of secret medicines prepared only by the advertiser: one states that he draws teeth gratis from 8 to 10; from 10 to 12, 6d. each; after that time for the usual fee. Another is headed "Chemists' profits," and contains the copy of a prescription, with the charge at some other shop compared to his own. In another part of the newspaper are the following by the same advertiser:—"Prescriptions dispensed at the retail price of the preparations they are composed of, at ———'s ——— " and "If you want a good and cheap cigar, go to ———." The same fragment of newspaper contains several other advertisements of quack medicines, &c., by Chemists and Dentists.

A Chemist advertising himself conspicuously as a member of the Pharmaceutical Society, states that, "having been an assistant with a surgeon and apothecary several years, in addition to his assiduous attention to acquire a knowledge of Pharmaceutical Chemistry and the art of prescribing medicines, it has been his undeviating study to obtain a knowledge of the diseases to which the human frame is liable." This is followed by a list of articles sold, commencing with "oils and colours," and terminating with "shaving brushes."

Our next specimen is headed "Challenge to the whole world. ——'s specific for Asiatic cholera, justly termed the Balsam of Life, is a certain cure for dysentery, diarrhœa, English cholera, black fever, &c."

"☞ All who can apply personally will be cured of the cholera gratis."

The list of testimonials is amusing. This advertiser is not a member of the Pharmaceutical Society.

A reverend gentleman publishes the following:—

"Prescription for general nervous debility:

Alcoholic extract of the Ignatia Amara.....	30 grs.
Powdered gum Arabic.....	10 "

Make into 40 pills."

Directions are given for preparing the extract "by pulverising the seed or bean, and subjecting the powder to the action of alcohol for 10 or 12 days, and then evaporating to a proper consistence. The cost of a supply for the above quantity will not exceed 2s. To those who decline the trouble of preparing the extract, the Rev. —— will forward the same quantity made into pills on receipt of 2s. 6d., or 30 postage stamps." Further information is given respecting the use and specific efficacy of the remedy, which is stated to be advertised as "a sacred duty."

A neatly printed circular, recommending a quack pill in the name of an old-established firm in the same street, contains the following:—"N.B. We are obliged to take this mode of advertising, as so many quacks and illiterate persons deluge the public papers with nostrums got up without any regard to chemical science."

"An Operative Chemist," by way of advertising his "Demulcent Cough

Lozenges" and "Family Pills," encloses a small sample of each in a bill containing an account of their virtues, with notice of other medicines, and a list of agents. The little packet is thrust under doors or thrown down areas, *pro bono publico*.

The Revalenta Arabica puff was unmasked in this Journal, vol. x., page 64; but by constant advertising the trade is kept up, and lentils are purchased under the above name at a very superior price.

It is needless to enumerate in detail the long list of "specifics," "infallible cure for rheumatism," "cough no more," "cure for consumption," &c., &c., prepared only by the advertisers—in some cases sold with rather extraordinary wrappers, on which the virtues of the medicine are described in terms not sanctioned by Lindley Murray, sometimes with a general denouncement of rival tradesmen, occasionally with a profession of disinterestedness, "profit not being desired."

In a few instances, the parties announce themselves as "Members of the Pharmaceutical Society," or "Pharmaceutical Chemist," but nearly as often (in the specimens before us) they style themselves Surgeons and Apothecaries; a majority, however, do not claim connection with any Medical or Pharmaceutical body, but designate themselves Chemists and Druggists.

The examples which we have given are fair specimens of undisguised quackery, and if we had no other cases to deal with, it would be easy to frame a regulation for the guidance of those who desire to avoid an unprofessional mode of conducting their business. But quackery has many shades and degrees. It is not confined to uneducated empirics or to those who resort to the puff direct, and openly set at defiance all professional conventionalities. Between the simple announcement that a consignment of goods has come to hand, or the circulation of an ordinary price list, and the most disreputable and impudent puff, there is a sliding-scale, so gradual that it is extremely difficult to define the precise point at which legitimate advertisement degenerates into quackery.

A correspondent has suggested a mode by which some approach to a classification might be attained, as follows:—"The cases in which I think immediate good may be effected, are where Pharmaceutical Chemists blazon forth their connexion with the Society as a recommendation to quack medicines. That a Member of the Society should advertise his 'Wind Pills.' &c., as the great discovery of the age, is not particularly creditable to himself; but that he should give prominence to his membership, in connexion with these advertisements, does unquestionably tend to bring discredit upon the Society; and upon that ground I conceive that the Council are justified in attempting to prevent such defamation of the character of the body, and bound at least to protest against it." Our correspondent proceeds to refer to another class of cases, and he gives an example, in which a Member of the Society, occupying rather a conspicuous position as a Chemist, advertises a chemical compound, prepared only by himself, as a superior stimulant, introduced by an army surgeon. The said preparation not being described in works on Chemistry and Pharmacy, and its composition being known only by the sole manufacturer, it is a secret preparation, and the question suggests itself, is it a quack medicine? If not, we may ask is Holloway's ointment a quack medicine?

Our correspondent also calls our attention to an advertisement by a manufacturing chemist of some note, who quotes several chemicals which are rather in demand at a very low figure per ounce, "and all other chemicals at manufacturers' prices." He asks whether this is a fair and professional mode of transacting business? the prices quoted being "cutting prices," and such as to deprive the retailer of any chance of competition, even in very small quantities. The question is asked partly in reference to the position of the parties concerned in these and similar cases; for, "if men of high standing adopt such a course, what may be expected of the rank and file?"

We also quote the following passage from the letter:—

"It is only to flagrant cases of violation of Pharmaceutical ethics, that, I think, we can at present apply a remedy, whether by action of the Council or by the members at large. I believe that the great *vis medicatrix naturæ* is at work upon the evil, and that as the results of an improved education are developed, we shall find the remedy. A perspective view of Pharmacy from its present position appears to me to indicate a much higher elevation within our reach than would have been contemplated ten years back. Upon the special departments included in our branch of the healing art, I see no reason why we should be content with equality with the medical practitioner. From what I can see, the medical profession will leave chemistry, botany, toxicology, microscopy, and the allied sciences, chiefly in our hands, if we will make ourselves masters of the opportunity. The demands made upon surgeons, absolutely prevent their attaining great proficiency in these subjects, without the neglect of departments which to them are of more direct importance."

The term toxicology in the above remarks is used, of course, in its chemical sense, not including that branch of the subject which is strictly medical. We may also observe, that in proportion as the Pharmaceutical body rises in its own legitimate sphere, it becomes more necessary that its Members should avoid encroachment on the province of the medical practitioner. We observed in the *Lancet* of February 9, some silly remarks on this subject, in which the writer (not the Editor, for *he knows better*), attributed to the Society a systematic usurpation of medical functions, and the use of the Pharmaceutical position as a recommendation for medical practice! In the exercise of the discretionery power which the Pharmaceutist must of necessity retain on account of the impossibility of defining the precise boundary line, it is possible that some individuals may occasionally transgress the proper limits. Such delinquency is, like quackery, an individual act, for which the Society cannot be held responsible. But it is desirable that the Society should establish and make extensively known the general principles of professional ethics which are recommended as the standard; and it must be observed that the higher the position of any individual, the more important is it for him to avoid any violation of the principles so laid down; and it is equally true, that as the Society rises in professional status and character, a more elevated standard of ethics will be expected to prevail among the Members.

There is a distinction between the responsibility of a member of the Society, and that of a Pharmaceutical Chemist who is not a member. The Pharmaceutical Chemist is certified to be a person duly qualified to carry on the business, being so certified and having paid the fee or subscription required by the bye-laws, he is registered as a Pharmaceutical Chemist. This registration is compulsory on the Council and Registrar, who are bound to include his name on the register, the prescribed conditions being fulfilled on his part. A member of the Society, besides the conditions above referred to, is bound by the laws and regulations made and established for the special guidance of the members, and as the Society is entrusted by the legislature with the duty of regulating the qualification of Pharmaceutical Chemists in Great Britain, it is to be expected that the members should adopt among themselves a higher standard of professional ethics than they could require to be acted upon by every person who merely obtains a certificate of qualification as a Pharmaceutical Chemist, but who is in no way responsible for maintaining the character or credit of the Society. On the same principle, a member of the Council has upon him a higher responsibility than that which belougs to an ordinary member; as he is liable, in reference to the matters under consideration, to be quoted as an authority by others whom his example might influence.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

LIST OF MEMBERS, ASSOCIATES, AND APPRENTICES (*continued*).

MEMBERS.

CHARD .....Churchouse, William B.	SHEFFORD ....Steel, Henry
HULL .....Smith, Thomas James	SOMERTON .....Clarke, Thomas
NEWCASTLE...Brady, Henry Bowman	TORQUAY .....Glanfield, George
PECKHAM.....Howell, Maurice	WETHERBY .....Houlton, James

MAJOR EXAMINATIONS.

Barker, Matthew Mark .....York
Peel, James .....Canterbury
Searby, William Martin .....Guildford
Tyler, Henry Wing.....Denton, Grantham

MINOR EXAMINATION.

Bamber, Henry Kelway .....Exeter
Farr, Archer.....Lambeth
Halliday, W. Jabez .....Pontefract
Marks, Nelson Samuel .....Cardiff
Payne, John ....Leighton
Williams, Henry Levi.....Newport

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	TOWNS.
Goodchild, Nathaniel	Mr. Wood	Brighton
Harrison, Stephen	Mr. Breary	Douglas
Head, John T.	Mr. Head	Lewes
Jones, Peter Cooke	Mr. Jones	Norton Folgate
Norrish, James	Mr. Searle	Crediton
Spearing, James	Mr. Dowman	Southampton
Tanner, Augustus F.	Mr. Dickinson	London

AT A MEETING OF THE COUNCIL,

February 6th, 1856,

MR. DAVENPORT, PRESIDENT, IN THE CHAIR,

IN pursuance of a notice of motion, Mr. DEANE introduced the following propositions:—

That a Prize or Prizes be offered for the best Collection of Plants (herbarium) collected by Registered Apprentices or Students of the Society, under 21 years of age, in any part of the United Kingdom, between the present time and August the 1st, 1857.

That a Prize or Prizes be offered to Members and Associates of the Society for the best practical Essay on the Preparation of Cerates, Ointments, and Plasters, including those contained in the three Pharmacopœias of England, Scotland, and Ireland.

That a Prize or Prizes be offered as above, for the best practical Essay on the Preparation of Extracts, including those contained in the three Pharmacopœias of England, Scotland, and Ireland.

All under suitable conditions.

Resolved,—That the propositions be approved, and that Mr. Deane be requested to furnish the proposed details and conditions for the consideration of the Council at their next Meeting.

ELECTION FOR THE NEXT YEAR'S COUNCIL.

The Lot having been taken, was declared to have fallen on Messrs. Bucklee, Davenport, Deane, George Edwards, Lea, Squire, and Woolley, who will therefore continue in office for the ensuing year.

PHARMACEUTICAL MEETING,

Wednesday, February 6th, 1856,

MR. J. T. DAVENPORT, PRESIDENT, IN THE CHAIR.

The following donations were announced:—

Journal of the Society of Arts, from the Society.
Journal of the Photographic Society, from the Society.
The Literary Gazette, from the Publishers.
The London University Calendar for 1856, from the University.
A large Crystal of Ammonia Iron Alum, from Mr. Copney.
Specimens of Wood Oil, from Mr. D. Hanbury.
Hickory Nuts, from Mr. Bentley.

Dr. O'Connor wished to correct an error which occurred in the report of what he had said at the previous meeting, as published in the *Pharmaceutical Journal* for January. He did not refer to the subject of the advertisements in the *Lancet* at all, but what he had said was, that no communication existed between Dr. Hassall and the editor of the *Lancet* in reference to the leading articles which had appeared in that journal.

The Chairman suggested that the best mode of correcting the error would be by addressing a note to the editor of the *Pharmaceutical Journal.*

Mr. D. Hanbury said, with reference to the wood oil, of which he had placed a specimen on the table, that a full account of it appeared in the January number of the *Pharmaceutical Journal.* It was probable, from its comparatively low price, that it would be used to mix with balsam of copaiba, and he was sorry that he could not point out any ready means by which its presence could be clearly indicated. The wood oil, however, possessed the remarkable property of becoming gelatinous when heated to about 260° Fahr., in a close vessel.

Mr. Redwood inquired of Mr. Hanbury whether he thought the gelatinizing of the wood oil was due to the presence of styrol?

Mr. Hanbury had not made any experiments with the view of determining that point.

Mr. Copney, in reference to the specimen of iron alum which he had placed on the table, said that there were some points relating to the mode of producing large and perfect crystals of this salt, which he would bring before the Society on a future occasion.

Mr. Waugh thought much praise was due to Mr. Copney for the talent and industry he had manifested in the production of this and other crystals of great beauty.

Mr. J. Williams exhibited to the meeting two bars of the metal *aluminium*, each weighing about six-and-a-half ounces. These samples were made by a Company recently established in Paris for the production of aluminium at a moderate price. Each of the bars exhibited was worth about £20.

ON THE DILUTED MINERAL ACIDS OF THE PHARMACOPŒIAS.

BY MR. SQUIRE.

I have been induced to bring this subject of the diluted acids before you this evening, with a view to elicit such valuable practical information as many of you are capable of giving. You are aware that the College of Physicians have

called upon this Society to appoint a committee to consider what alterations can advantageously be made in the Pharmacopœia; to consider, in fact, the three Pharmacopœias now existing in this kingdom, and to suggest the most appropriate modes by which they can be made to assimilate, and constitute, what is so much to be hoped for, a National or British Pharmacopœia.

The committee has commenced its labours, and a list has been prepared and sent to all who were thought most likely to contribute useful information.

The committee propose to examine the list *seriatim*. Now, on the first page occur the several acids of the three Pharmacopœias; the acetic acids of every strength and denomination precede the acids which we propose to discuss; these must form a separate subject for consideration; we therefore pass them over for the present.

It will be in the recollection of some present, that amongst the proposals for a National Pharmacopœia which I made in a paper read in 1845, there was one for adjusting the diluted acids and alkaline solutions, with a view to a ready means of neutralizing one with the other.

In the Dublin Pharmacopœia of 1851 this object seems to have been kept in view; the College have so arranged the diluted mineral acids, that the same measure of any one of them contains exactly its equivalent in grains, and this measure is somewhere about seven drachms.

Now I would propose, as an improvement on this, that exactly a fluid ounce should contain this equivalent in grains; it is a quantity easily remembered, and by reference to a table of equivalents, a prescriber wishing to give any neutral salt, in a state of effervescence, has merely to take an equivalent of any carbonate, *in grains*.

But in the Norwegian Pharmacopœia, recently published, a different course has been taken to accomplish the same object, viz., a decimal system, involving in its application a knowledge on the part of the prescriber of chemical equivalents, which are now well understood.

The principle on which this is founded is, that all the diluted acids and solutions of alkalies and salts, consist of one-tenth part of substance and nine-tenths of water,—thus 540 of diluted nitric acid contain 54 of real acid—1,000 grains of solution bicarbonate of potash contain 100 grains of salt.

So that all being diluted alike, these solutions would be used in the ratio of their chemical equivalents—when we wish an acid and an alkali, for example, to combine and form a neutral salt. Thus 54 parts, minims (or drachms) of diluted nitric acid would be added to 100 parts, minims (or drachms) of solution of bicarbonate of potash, if we wish to give nitrate of potash in the form of an effervescing mixture, and so with the rest.

In the case, however, of an insoluble substance, as carbonate of magnesia, we would proceed as follows: inasmuch as the acid with which we wish to combine it is diluted ten times, we must employ ten equivalents of diluted acid to combine with one equivalent of base. Thus we should take 400 minims of dilute sulphuric acid to neutralize 42 grains of carbonate of magnesia.

There are several advantages attending the use of this system. In the first place, acids prepared according to these formulæ would differ but little from those in use at present in this country, as the following table will show:—

Table showing perc-entage of Real Acid.

	London.	Edinburgh.	Dublin.
Acid hydrochlor. (dilut.).....	9.	..... 10.2	..... 9.35
" nitric "	12.	..... 11.2	..... 13.5
" phosphoric "	10.5	..... —	..... —
" sulphuric "	12.25	 11	..... 10.5

The proposed acids containing uniformly 10 per cent.

This system would not be affected by any alteration in the weights and measures, since all the preparations would consist of one part in ten, whether that

unit be an ounce, a gramme, or anything else, and this is a great consideration, as the subject of a decimal system of weights and measures will be brought under the notice of Parliament this session. In order to make the system complete, all solutions of salts and alkalies in the Pharmacopœia should be reduced to the same standard.

Inasmuch as we commonly use measures for dispensing liquids, it would be necessary to modify our formulæ slightly, in order to meet this circumstance; therefore, when we have weighed out an ounce troy of dry acid, or rather an equivalent quantity of the hydrated, we must make it up to ten fluid ounces with water, and then every ten minims of this solution will contain one grain of dry acid.

Our diluted sulphuric acid would be prepared thus:—

Sulphuric acid, $2\frac{1}{2}\overline{3}$ *troy* $= 2\overline{3}$ dry acid. Water sufficient to measure twenty fluid ounces.

400 minims of this solution should saturate 530 minims of the solution of the subcarbonate of soda.

Our diluted nitric acid:—

Nitric acid, sp. gr. 1.42 $2\frac{1}{2}\overline{3} = 1\frac{1}{2}\overline{3}$ dry acid. Water sufficient to measure fifteen fluid ounces.

540 minims of this solution should saturate 530 minims of solution of subcarbonate of soda.

And all others would bear the same relation to each other.

It is obvious that if this plan be carried out, the alteration in the weights lately introduced by the Dublin College, must be abandoned, because their ounce contains only 437.5 grains, whilst the fluid ounce contains 480 minims; but in this proposed mode of making our preparations, it is essential that the divisions of the weight and the measure should correspond; that, in fact, the ounce by measure and the ounce by weight should bear the same relation—the drachm to the drachm, the minim to the grain.

Now these conditions are completely fulfilled by the troy and the fluid ounce, both being divided into eight, and subdivided into 480 parts, and these will serve our purpose, until, by the introduction of a decimal system of weights and measures, the present weights having the same name but differing in value, shall be swept away.

A desire to see some definite principle carried out in framing our new Pharmacopœia, has been my inducement to string together these ideas; and even should these propositions not be adopted, I trust that the discussion this evening may lead to a more complete and perfect system of formulæ than at present exists.

Mr. Waugh referred to the approximation to equality in the strength of some of the diluted acids as ordered in the three British Pharmacopœias, which would render the adoption of one uniform standard of strength in such cases a point of easy accomplishment; in other cases, however, a more decided change would be necessary. He thought it very important that the quantities should be ordered by weight and not by measure, as the measure glass was not calculated to afford very accurate results.

Mr. Bell said one of the principal objects contemplated in the proposed alteration of the diluted acids was, to assimilate the formulæ of the three British Pharmacopœias. In doing this they should, of course, endeavour to fix upon a system of dilution that would be simple, and at the same time convenient. He thought the equalization of the neutralizing power of the different diluted acids would accomplish what was required.

Mr. Bastick reminded Mr. Waugh, that by the use of vessels with narrow necks, such as are used in volumetrical analysis, the source of inaccuracy referred to was obviated.

Mr. Deane thought the proposition to adjust the strength of the diluted acids used in medicine according to one uniform standard, in which the quantity of acid should bear a simple relation to the weight or volume of the mixture, was a very good one, and ought, if possible, to be carried out. There was much confusion in reference to the strength of the diluted acids at present, and it would be a great convenience both to dispensers and prescribers to have the formulæ simplified. What standard of strength should be adopted, was, however, a question upon which some difference of opinion might arise. He thought the difficulty was not insuperable to the adoption of such formulæ for the diluted mineral acids, as that equal volumes of them should have the same saturating power.

Mr. Giles said that it should be borne in mind that Mr. Squire's communication was separable into two questions—the first, one of principle; the second, of detail. Mr. Squire had shown them that in the British Pharmacopœias up to the present time there had been no plan of uniformity characterising the dilution of the acids for medicinal purposes, and he apprehended that no one would dissent from Mr. Squire's first proposition, that for the sake of the scientific reputation of the new Pharmacopœia, as well as to facilitate comparison of one dilute acid with another for practical purposes, it was very desirable that some plan of uniformity should pervade the whole of them. The remaining question then was, what standard should be adopted? and Mr. Squire had brought forward two plans, though more particularly enlarging upon that which rested upon the principle of each solution containing one-tenth part of the *dry* acid, to which he gave a decided preference. Now, at first sight, he (Mr. Giles) was disposed to prefer the other method recited by Mr. Squire—that equal volumes should be chemically equivalent—1,000 grain measures of each containing an equivalent in grains of dry acid. The convenience of this system was manifest: it would enable the prescriber or the dispenser at once to substitute volume for volume without effort of memory or calculation; but it was clear that to carry it out to completion, the same law should be extended to the alkalies, such as liquor ammoniæ and liquor potassæ; and here difficulties were immediately presented. It would be doing violence to old usage to alter the strength of liquor ammoniæ, and the conditions which it was necessary to observe for the satisfactory preparation of liquor potassæ, would make any interference with *its* strength a clumsy expedient—yet the saturating power of one was about four times that of the other. This was, however, to anticipate difficulties which possibly might be overcome, and in that hope he was disposed to prefer the plan which Mr. Squire rejected, of bringing all the dilute acids to similar saturating volumes.

The Chairman thought it desirable, in considering this question, to bear in mind that equivalents in power of saturation, and equivalents in therapeutical action, were not the same; at least this would be found to be the case according to the posological table appended to Mr. Phillips's translation of the Pharmacopœia. Therefore, if the strengths of the acids were adjusted so that equal volumes should have the same neutralizing power, the doses would still not be uniform.

Mr. Squire, jun., thought there were difficulties in the way of having the strength of the diluted acids such that equal volumes should be equivalent in neutralizing power. The acids formed according to that principle would differ widely from those now in use—the phosphoric acid especially, which would be almost doubled in strength. Then, again, in the solutions of salts, bicarbonate of soda would be excluded on account of its insufficient solubility. According to the ten per cent. system the acids would not be much altered, and liquor ammoniæ would retain its present strength.

Mr. Redwood doubted whether medical men could be expected to recollect the equivalent numbers of the different acids. He was disposed to think the equalization of strength in regard to neutralizing power would be found the

most convenient for the prescriber, but he had not given the subject much consideration, and must admit that some of the arguments advanced in favour of equal per-centages of real acid had considerable weight. He recollected that some time ago Mr. Squire suggested that the preparations of the Pharmacopœia should be so adjusted that the doses of similar preparations should be equalized. He (Mr. R.) had not lost sight of this proposition, which was deserving of consideration in framing a National Pharmacopœia, and he thought with regard to the diluted acids that the equalization of their neutralizing power would tend more nearly to the realization of the proposition referred to than would the other proposition which Mr. Squire seemed now to be most in favour of.

Mr. Barford hoped that in any alteration that might be adopted the memory of the prescriber would not be unnecessarily taxed by having to recollect the equivalents of acids and alkalies. If it were possible to assimilate the doses, he thought that would be the most convenient mode of adjusting the strength of the preparations referred to.

Mr. Horncastle thought if posological equivalents coincided with chemical equivalents, the plan of having equal volumes to correspond in neutralizing power would be the best; and in such case he would suggest that, instead of making the fluid ounce and its subdivisions to bear a simple relation to the equivalents, 500 grain measures should be substituted for the ounce.

Mr. Squire said he was glad to find that all those who had spoken on this subject admitted the importance of readjusting the strength of the diluted acids. The only question appeared to be as to which of the two methods he had referred to was the best. He had been originally in favour of making equal volumes equivalent in neutralizing power, and it was not without due consideration that he had relinquished that method in favour of the other. There were great difficulties in the way of carrying out the former method, which did not apply to the latter; and he was therefore now decidedly in favour of making the diluted mineral acids to contain equal per-centages of the anhydrous acids.

PHYTOLOGICAL CLUB.

February 13*th*, 1856.

ROBERT BENTLEY, F.L.S., PRESIDENT, IN THE CHAIR.

Communications were received from several Members respecting the distribution and exchange of plants, which were referred to the Curators.

A Donation was announced from Mr. Bentley, consisting of thirty dried specimens of *Anemone Pulsatilla* from the neighbourhood of Hitchin.

Mr. Hanbury exhibited specimens of the fruit of *Trapa bicornis*, Nat. Ord. *Haloragiaceæ*, from Shanghae, China, where the plant is cultivated upon the canals. The fruit is used abundantly in China as an article of food.

The Curators announced that they had for distribution amongst the Members of the Phytological Club numerous specimens of *Arenaria ciliata*, *Helianthemum canum*, *Helianthemum polifolium*, *Lathyrus maritimus*, *Erica vagans*, and *Dabeocia polifolia*, for which they recommended early application.

A paper was then read

ON A MONSTROSITY OF THE PAPAVER BRACTEATUM.

BY ROBERT BENTLEY, F.L.S., A.K.C.

The occurrence of monstrosities—as all deviations from ordinary structure are termed—is always worthy of notice, because no circumstance in the life of the plant has tended more than these to the discovery of that great generalisation in botany which traces to one common germ all the organs of the plant, whether vegetative or reproductive—flower buds being thus proved to be formed of the same elements as leaf buds, merely modified to suit the special purposes for which they are required. A flower bud being thus shown to be homologous to the leaf bud, its parts are but altered leaves, arranged with regard to one another as the leaves upon a branch.

We see proofs of this doctrine constantly brought before us in the natural condition of flowers. Thus, in a vast number of instances, we see a gradual transition of the ordinary leaves into the sepals, and also very commonly in the change from sepals to petals; in fact, these two outer organs of the flower are, in the great majority of cases, readily traceable back to the ordinary leaves from which they are but slight modifications. The occurrence of transitional states between petals and stamens is, however, less frequent, as might be supposed, from the different functions which these two organs respectively perform. Examples, however, of such a condition may be noticed in many plants. Up to the stamens, therefore, we have no difficulty in tracing in the normal condition of the parts of the flower a regular and gradual transition from the ordinary leaves, thus forming a strong proof of their being formed upon a common type with them. The occurrence, however, of transition states between stamens and pistils is unknown in the normal condition of flowers, the difference in the functions performed respectively by these two organs being so opposite, and thus necessarily leading to a corresponding difference in structure. We must therefore look to monstrosities for examples of such conditions. Even these are by no means common.

Having been fortunate, however, to obtain a specimen of this kind, I have introduced the description of it by the above introductory remarks. This which I now exhibit to the meeting is a monstrosity of the flower of *Papaver bracteatum*, which shows in a marked manner the gradual transition of stamens into pistils. The floral envelopes and stamens being removed we observe several whorls of intermediate bodies between stamens and pistils, the centre of the flower being occupied by a compound pistil not differing materially from the ordinary structure of this body in such flowers generally. The outer whorls of the intermediate bodies differ from the ordinary stamens in their colour, in being of a more fleshy nature, and in being enlarged at their upper extremity and inner surface into rudimentary stigmas ; in other respects they resemble them, being possessed of evident anthers containing an abundance of pollen. The whorls next in succession to the outer ones gradually lose their anthers, become more fleshy, bear evident stigmas, and on their inner surface, which is slightly concave, possess rudimentary ovules. Still more internally the intermediate bodies, whilst resembling the latter generally, become more concave on their inner surface, and bear numerous perfect ovules, and within these the two edges of the concavity of the intermediate bodies unite, and form respectively one-celled pistils containing numerous ovules, and finally, these bodies unite and form a compound pistil in the centre of the flower, which, however, still shows traces externally of its compound origin.

The specimen thus described must be considered as a very curious and interesting one; it was obtained at the Royal Botanic Gardens last summer, a similar specimen having been also observed by me the previous year on, I believe, the same plant; the probability is, therefore, that such a curious variety will become permanent, and I shall look carefully for it during the next summer.

Mr. Bentley also exhibited the following specimens:—

1st. A fasciated branch of the common larch (*Larix Europæa*), obtained from Mr. Prentis. Mr. Bentley exhibited this as a very good example of a fasciated branch, and made some remarks upon the cause of this curious mode of growth.

2nd. A curious monstrosity of the fruit of the common orange (*Citrus aurantium*), forwarded to him by Mr. Brown, a Member of the class of Botany and Materia Medica during the present year. In this specimen the style and stigma remained in the same condition (with the exception of being slightly enlarged) in which they may be commonly observed in the fully developed flowers of the orange-tree, in consequence of which the upper extremity of the orange, instead of being smooth, presented a somewhat clubbed-shaped body, about half an inch in length projecting from it.

3rd. A monstrous development of the florets of the common Tansy (*Tanacetum vulgare*), obtained from Mr. Braithwaite. In this specimen the abnormal florets projected two or three lines above the ordinary ones, and formed hardened hollow protuberances. Mr. Bentley believed that this curious development was caused by the attack of insects, which thus produced a kind of gall.

After some discussion, the President announced that the next meeting would take place on Wednesday evening, March 12th, at half-past eight o'clock.

PHARMACEUTICAL SOCIETY,

NORTH BRITISH BRANCH.

A Meeting of the Pharmaceutical Society was held in the Rooms, 72, Princes Street, Edinburgh, on Friday evening, the 8th February, at nine o'clock.

Owing to the unavoidable absence of the President, Mr. James Robertson was called upon to preside.

Dr. Stevenson Macadam read a communication on

THE MANUFACTURE OF SOAP.

The author stated that he had not much new matter to communicate in the present paper, but having lately visited the Soap Works at Leith, for the purpose of minutely studying each part of the process, and having obtained therefrom specimens illustrative of this branch of manufacture for exhibition at his lectures, he thought the Society would take an interest in examining the specimens, and hearing a short exposition of their nature and source. The manufacture of soap consists mainly in the proper combination of certain principles in oils and fats with caustic soda. The fatty matter most generally used is tallow, to which lard and cocoa-nut oil are added, when the prices of these articles are such as to warrant their admixture, or when they are specially desired. In the yellow or resin soaps, a greater or less proportion of resin is employed. Mutton tallow is the best, because it is the whitest, and accordingly it is always employed in the preparation of white soap. Beef tallow being more coloured, is retained for the yellow and other coloured soaps. Large quantities of beef and mutton tallow are now received from Australia, and even from St. Petersburg. The freight of Russian tallow before the war commenced, was 30*s.* a ton ; but now, in consequence of the strict blockade of the Russian ports, the cost of transit of the tallow is raised to £20 a ton. The overplus of freight, no less than £18 10*s.*, the people of Great Britain pay, and the Russians receive the same for their tallow in these war times as they did in previous years.

Dr. Macadam entered minutely into a discussion of the theory and practice of soap-making, including fancy soaps ; and illustrated the various stages of the process by means of diagrams and specimens.

ON SWEET SPIRIT OF NITRE.

BY D. R. BROWN, OF J. F. MACFARLAN AND CO.

Mr. Macfarlan, in the conclusion of his paper on Methylated Spirits, read at last meeting, intimated an intention of submitting some remarks on sweet spirit of nitre prepared from that spirit. The experiments, however, not being completed, some important and rather difficult questions remaining to be answered, I propose reading a short paper on Sp. Æth. Nit. from ordinary rectified spirit ; believing it to be a necessary preliminary to any remarks upon its production from methylated spirit. I may, however, here say that we have found no difficulty in preparing a sweet nitre from methylated spirit, and offer for your inspection a sample nearly of the strength of the Edinburgh Pharmacopœia, and which in a dose of three drachms was found to act no otherwise than the ordinary preparation.

It appears that sweet spirit of nitre was known so early as the 13th century. It is at least something in its favour, that after six hundred years it still maintains its ground, and is in very general use.

An immense number of formulæ have been given for its preparation ; but, however prepared, it consists essentially of impure hyponitrous ether and rectified spirit, in variable proportions; and these proportions vary from twenty per cent. of the ether down to one or even less. These variations are not indeed permitted by the Colleges of London, Edinburgh, or Dublin, each having for itself a formula for the preparation, and also a standard strength; yet each College differs from all the others. The Edinburgh formula gives a preparation containing 20 per cent. of hyponitrous ether, while that of the Dublin is only 8.70 per cent. With respect to the London formula it is difficult to say what its per-centage may be. The most extravagant calculation will afford no more than 16.43 per cent., while the reality is undoubtedly much below this amount. We have examined samples of what was termed "the best," and been unable by fractional distillation to find more than a mere trace ; among these were samples from London. It is upon the presence of the ether that

the virtues of the sweet spirit of nitre depend. It is surely a sad condition of affairs when a prescription, written and prepared in London or Dublin, shall, when taken to Edinburgh, have the dose increased to two doses and a half; or, that when written in Edinburgh and prepared in London or Dublin, the dose should go down to less than one-half. But more sad still, that, the dose being either 20, 10, or 8.70 per cent. of the ether ordered, it should in reality contain only one per. cent. It is surely time that variations in medicinal preparations were done away with—over the earth if possible—but at all events, at home; and more especially such variations as have been pointed out. We have long felt the necessity of calling the attention of the Society to this preparation. The permission by the Government to employ methylated spirit in manufactures gives us the opportunity.

All the formulæ, however numerous, given for the preparation of Sp. Eth. Nit., arrange themselves under one or other of three modes, having for their result a mixture of hyponitrous ether and strong alcohol, and are but modifications of one and the same process—namely, the production of hyponitrous acid by the action of nitric acid upon an excess of alcohol. NO_5 is made to act upon alcohol indirectly or directly. Either the NO_5 is eliminated from a salt containing it while in contact with strong alcohol, or the acid first freed from combination is added to the alcohol. The third mode is, first, the preparation of hyponitrous ether, and then its solution in rectified spirit. The second of these modes is that followed by the London Pharmacopœia, and the third, that by the Edinburgh and Dublin.

The action of NO_5 upon alcohol ought to receive an investigation such as, so far as we know, it has not hitherto met with; for although the number of products formed and separated are numerous, yet the precise conditions which give origin to these are not sufficiently defined; a few degrees more or less of heat, or an acid more or less strong, modify the results. But we confess the investigation to be most difficult. What we have to do with at present is the result of the action of NO_5 upon rectified spirit, as it offers itself to us in the preparation of the Sp. Eth. Nit. of the Pharmacopœias. The products of that action divide themselves into three groups, one of which passes off in the state of gases; another abides in the flask or retort; and the third, that with which we have to deal, passes over into the receiver. According to the London formula, we will have in the receiver a finished product, requiring no more to be done to it, consisting of a solution of impure hyponitrous ether, containing aldehyde, in a very strong rectified spirit. By the Edinburgh and Dublin formulæ we have a product which has yet to undergo purification, and afterwards to be mixed with its proper proportion of rectified spirit. But that purification does not give a chemically pure $AeO+NO_3$; it also contains aldehyde. The product by the formulæ of all the Colleges is then alike in this—they all contain $AeO+NO_3$, alcohol, and aldehyde, or the hydrated oxide of acetyle ($C_4\ H_3\ O+HO$).

Pure hyponitrous ether—or, in chemical language, the hyponitrite of the oxide of ethyle ($C_4\ H_5\ O+NO_3$), would require to be somewhat better known than it is.

Liebig, as quoted in Turner, gives its density at 60° as 947 and boiling point 62°				
Prof. Christison, that prepared by the Edinburgh process	"	"	899	" 70°
Meissner, as quoted by Prof. Christison	"	"	909	no boiling point
The late Dr. Pereira	"	40°	886	boiling point 70°
Dumas	"	"	886	no boiling point
Regnault	"	No temp.	886	boiling point 69°.8

He also says that "pure nitrous ether is colourless;" of this we have met with no specimen.

Mitscherlich gives it also as "colourless"	density at 40° as 886 and boiling point 80°			
The Dublin Pharm.	"	60°	900	no boiling point
The late Prof. Duncan, of Edinburgh, states that when simply washed with HO, its	"	No temp.	912	no boiling point
And after removing acid by KO	"	"	896	"
And when re-distilled	"	"	866	"
We have thrice prepared it by Liebig's method, and the product was	"	60°	900	boil. point 62°—64°

It is quite manifest that the densities and boiling points given cannot belong to one and the same fluid; nor can it be seen how the admixture of aldehyde of D. 790 at 65° and boiling at 70° can reconcile them. May it not be that $AeO + NO_5$ is formed, in some cases, as well as $AeO + NO_3$? Both its D. (1.112) and B. p. (185°) are high.

We have very often prepared the $AeO+NO_3$ of the Edinburgh Ph., and have frequently been unable to bring up the D. to 899 by solution of Ca+Cl or washing. Weak solution of ammonia, however, we find to answer the purpose, and we are no longer annoyed by a density ranging from 886 upwards; from 899—900 is now easily arrived at.

It may be instructive to state the result of the re-distillation of the product got by Liebig's method. When procured its boiling point was 62—64, and D. 900 at 60°. On re-distilling it, one-half had come over, and the thermometer stood at 66°; the D. of this first portion was 899—900 at 60°, and its B. p. 62°—64°. The temperature quickly rose in the distilling flask to 70°—72°, and a considerable quantity came over, the D. and B. p. of which were precisely the same as the first portion. The last portion came over between 72°—80°. Its D. was 900 at 58°, and its B. p. 62°—64°. Yellow vapours appeared in the distilling flask, and the small quantity of fluid left was strongly acid. Contrary to the indications of the thermometer, we find but one fluid partially decomposed in boiling.

In order to compare the formulæ of the different Pharmacopœias, and to do so fairly, the alcohol and NO_5 made use of by each has been reduced by calculation to dry alcohol and dry NO_5, taking for data for these calculations the table of Gay Lussac, as given in Prof. Christison's *Dispensatory*, for the alcohol, and Ure's table for NO_5 in Turner. The products also have been dealt with in the same way, and the loss of alcohol in each process found.

The following short tables will best tell their own story:—

	MATERIALS USED.		THE PRODUCT CONTAINS	
	Dry Alcohol.	Dry NO_5	Dry Alcohol.	$AeO+NO_3$
London	28.143	2.982	17.356	4.140
Edinburgh	32.547	8.368	21.93	6.975
Dublin	33.771	3.586	29.54	3.600

Of dry alcohol, allowing for the hyponitrous ether, the loss in each process is:—

London ..... 28.143 less found in product 19.895 = Loss 8.248
Edinburgh ..... 32.547 " " 26.208 = " 6.339
Dublin ..... 33.771 " " 31.757 = " 2.014

The per-centage loss is—London, 29.3; Edinburgh, 19.47; Dublin, 5.96. Taking the strongest, the Edinburgh, as the standard 28.905=6.975 of $AeO + NO_3$, then 5.58 instead of 4.140 ought to be contained in the London, and 7.99 instead of 3.6 in the Dublin.

The above numbers refer to weight and to dry alcohol and dry $AeO + NO_3$; but we have to deal with the bulk and with water therein, when Sp. Eth. Nit. is dispensed.

The bulk product of the

London is 28 fluid ounce, containing 4.60 of dry $AeO+NO_3$.
Edinburgh, 38.75 " " 7.75 "
Dublin ... 46.00 " " 4.00 "

and the medicinal value of these is by bulk—London, 16.43; Dublin, 8.7; and Edinburgh, 20 per cent. of $AeO + NO_3$. Difference of density, which would make a slight alteration, has not been taken into account here, and with regard to these calculations, there can be no doubt as to the Edinburgh and Dublin results. The London, however, have gone on the extravagant supposition that the whole NO_5 is converted into NO_3, and united with its equivalent of AeO, which is most unquestionably not the case. They are also based upon the supposition that the alcohol in the London product is of sp. gr. .825. The impossibility of finding any indisputable data rendered these necessary.

Without doubt the Edinburgh process, as modified by the Dublin College, is the best.* It is the easiest, the safest, and most productive; and it possesses this prime

* The NO_5 ordered by the Edinburgh Pharmacopœia, is of D. 1500, which is an objection of more force than at first sight appears; for a pure acid of that D. is scarcely to be found in the market. Dr. D. Maclagen, however, has shown, what is practically valuable, that an increased quantity of a weaker acid will answer the purpose perfectly.

qualification—its results are defined and definite. There is no dubiety as to the quality or strength of the product. Its composition is fixed, and it can only vary by internal change or intentional admixture. It undergoes both of these, the first rendering the second absolutely necessary. The Sp. Eth. Nit. of the Edinburgh Pharmacopœia changes very rapidly. In a very few days after its preparation, a large amount of free acid is found to exist in it, which goes on increasing ; and its removal must be accomplished before the sweet nitre can be dispensed, unless all parties are regardless of the chemical constitution of what is prescribed. As an instance, let us suppose a very common case. That a prescription contains iodide of potassium and sweet spirit of nitre. If it is made up with the sweet spirit of nitre, almost universally found in use, no change, or a very small one, will take place upon the chemical constitution of the KI ; but if made up with Sp. Eth. Nit. of the Edinburgh Pharmacopœia, which has been made but a short time—a week perhaps—then, instead of KI and a colourless fluid, we will have a deep brown liquid, containing $KO+NO_5$ and free iodine. But the Edinburgh preparation is not singular in undergoing this change. It takes place more or less in every sample we have met with, and, so far as we can judge, just in proportion to the amount of $AeO + NO_3$ in the preparation. The weaker it is, the better it keeps. Less acid is found in the fluid, just because less existed in it. It is to this proneness to change that we ascribe the almost universal departure from authority, both as to *modus operandi* and per-centage of ether, which has taken place. The Pharmaceutical Chemist *cannot make* sweet spirit of nitre in drachms or half-ounces every time he dispenses a prescription containing it. He must make or buy an article that will retain its properties for at least a reasonable time ; and the manufacturing chemist cannot sell an article which spoils in a day or two, for no one will have it from him. Thus both are compelled to hunt about for better processes, and not finding them, either to give up making or selling, as the case may be. Or else the Pharmaceutical Chemist buys and uses whatever is offered to him, asking no questions. We have met with no specimen which contained the full amount of $AeO+NO_3$, but we have met with it where it held internal evidence that at one time it had contained all it ought. And we have found in our own experience, that after some weeks, a sweet nitre, originally made according to the Edinburgh Pharmacopœia, with 20 per cent. of $AeO + NO_3$, was deficient to a considerable extent, eight per cent. having disappeared.

The change which occurs in sweet spirit of nitre has been long known, and many endeavours have been made to prepare it without this liability. Some, indeed, deny that this liability is inherent in the preparation, and among others, the late esteemed Pereira mentioned that he had some which had been in his possession for years, "and which possessed only slight acidity." It is to be regretted that the formulæ and original strength of these keeping sweet spirits of nitre are not given. It is also asserted that sweet spirit of nitre made with $AeO+NO_3$, made according to Liebig's process, keeps better than that made by the ordinary process. So far as our experience goes, this last assertion is true; but the only vehicle we have found which will give a stable mixture is absolute alcohol—confirming Professor Christison's observation. It is obvious that the price of sweet spirit of nitre made with $AeO+NO_3$, procured by Liebig's process would tend to render its use very limited indeed. But whether it would or no, are we at liberty to follow that mode ? We think not. We have already said that the product of the formulæ of all the Colleges contain with $AeO+NO_3$, and rectified spirit, aldehyde, or the hydrated oxide of acetyle ($C_4 H_3 O+HO$). It is known to be contained in the spirit of nitre of the Pharmacopœia. Are we then at liberty to remove that which though undoubtedly an impurity in $AeO+ NO_3$, is yet an integral part of sweet spirit of nitre ? There is some reason to believe that the presence of the aldehyde is the cause of the decomposition of Sp. Eth. Nit., but it may be, for aught we know, upon the presence of the aldehyde that some of the medicinal value of that preparation depends, and thus the question remains, will its removal, while it improves the keeping qualities, not destroy its medicinal value ?

With regard to the use of absolute alcohol as the solvent of the ether, there does not appear to be any other good objection than the difficulty and expense of procuring it; and that is though not insurmountable, yet a very serious objection.

But are these changes indeed absolutely necessary ? A much weaker preparation has been in almost universal use for many years past, and not many complaints have been heard against it. The Edinburgh process is perfect in its details with, we

think, one exception, namely, the use of milk of lime to neutralize the impure $AeO + NO_3$, sol. of ammonia, ordered by the Dublin formula, as already mentioned, having been found to answer better. But the proportion of $AeO + NO_3$ is too great to give a fluid that will keep. In fine, we believe that, were the standard of all the Colleges made 10 per cent., all the difficulties would be overcome. Such a preparation would keep a reasonable time, and be produced at a moderate price. It would give a spirit which would answer every purpose, and leave without an excuse any attempt at the production of a weaker, which will not be the case so long as conditions are laid upon the manufacturer which he finds it impossible to fulfil. The present formula tells him to make and mix 20 per cent. of hyponitrous ether with 80 per cent. of rectified spirit; it is so clear and excellent in its directions that neither doubt nor difficulty meets the operator—he can most easily comply with the demands of the formula. But he has those who supply the public to meet with, and they demand from him, and not unreasonably, that he shall supply them with a spirit of nitre which will hold its integrity for a longer time than a week or ten days; and he can comply with this demand also. But he cannot conjoin the demands of the formula and the consumer—one or other must give way. It is surely bad policy to give the wrong-doer a good excuse for his malpractices. As it is at present, no honest manufacturer can advantageously enter into its preparation, for no one will make use of the genuine production. We have never been able to prepare a sweet spirit of nitre with 20 per cent. of the $AeO + NO_3$ of the Edinburgh Pharmacopœia that did not begin to decompose within a day, and when sent out our friends have found it both in respect of strength and free acid so totally unlike anything they had hitherto met with, that they refused to have anything to do with it.

Before leaving the spirit of nitre of the Edinburgh Pharmacopœia, we may say that while the tests given for its purity are perfectly accurate, they must be applied with a caution that the D. .847 may be given by the addition of water, and that the solution of CaCl be such as to contain about 40 per cent. of dry CaCl. It is to be observed, also, that the tests given are only applicable to a very recently prepared spirit. A sample made according to the Edinburgh Pharmacopœia on Jan. 7th, of D. 847 and which separated by half its bulk of solution of CaCl, containing 40 per cent. of dry CaCl, 12 per cent. of $AeO+NO_3$, was tested on Jan. 17th with solution of CaCl of different strengths. The following are the results:—

Sol. CaCl	containing	20	per cent.	dry CaCl,	sepd. of $AeO+NO_3$,	8.9 per cent.
"	"	30	"	"	11.	"
"	"	40	"	"	11.5	"
"	"	50	"	"	10.	"
"	"	60	"	"	8.	after two hours in a 2nd experiment, 9 per cent.

It has already been said that the examination of some specimens marked "the best," from London, gave scarcely a trace of $AcO+NO_3$. This ought not to be ascribed to adulteration, for experiment has shown us that it is not only possible, but really the fact, that nearly the whole product may be drawn over before the production of $AeO+NO_3$ commences. The late Dr. Golding Bird many years ago made some investigations into the nature of the products left in the retort after the preparation of spirit of nitre by the formula of the London Pharmacopœia. That which we would call your attention to in his results is the very large amount of hyponitrous ether found by him in that residue. He has not given the quantity found, but we are much mistaken if he does not give data for saying that by far the largest portion of the ether was left to be thrown away. This we suspect is the case still. In one experiment, where 14 fluid ounces were ordered to be drawn over, as being the amount of the product, nearly the whole came over before a trace of hyponitrous ether made its appearance.

We will give the details of an experiment made on Jan. 21st, 1856:—40 fluid ounces of alcohol, of D. 838, were mixed with $3\frac{1}{2}$ fluid ounces of pure NO_5, of D. 1420 or thereby (it was found to be 1415 at 71°), and distilled. The quantity ordered to be distilled over is 28 fluid ounces. It boiled at 176°—178°, and when the temperature had reached 182°, 21 fluid ounces had come over into the receiver. The D. of this portionwas.834, and was alcohol without the very slightest taste or smell of nitrous ether. The next portion came over below 184°; it measured 3 fluid ounces, and its D. was .837,

and in other respects altogether like the first. The third portion measured about 4 fluid ounces; its D. was .840, and was not perceptibly different from fine spirit. The temperature had now reached 188°. The fourth portion measured 3 fluid ounces; its D. .845, and it was merely flavoured with Sp. Eth. Nit. The temperature was now 192°. The fifth portion was 1½ fluid ounces of D. .854, tasting distinctly of sweet nitre. Up till this period no other action could be perceived than ebullition. There was no escape of gas through the receiver. When, however, those 32½ fluid ounces, or thereabout, had been distilled off, action began, the thermometer falling from 192° to 182°; action was vigorous to 180°, where it remained for a short time, and on removing the gas-burner it fell gradually to 168°, and all action was nearly at an end. The last portion amounted to 8½ fluid ounces; its D. was 890; and when treated with half its bulk of solution of CaCl, containing 40 per cent. of dry CaCl, it separated 46 per cent. of ether, whether the $AeO+NO_3$ of the Edinburgh Pharmacopœia was not examined into. The first, second, and third portions were mixed together, and gave faint indications of aldehyde, as did the fourth. With the fifth, alcoholic solution of KO gave distinct coloration; and with the sixth, the colour was deep. We think this experiment bears out the remark that nearly the whole product may come over without a particle of $AeO+NO_3$.

Some specimens for the Museum (description and history to be afterwards given), presented to the Society by Professor Christison, were exhibited to the meeting, and likewise a remarkable specimen of Guaiacum, by Mr. Robertson.

Bunsen's Gas Lamps, of various sizes, were shown in operation, and explained by Dr. S. Macadam.

The Board of Examiners for Scotland will meet for the examination of Members, Associates, and Apprentices, in the Society's Rooms, 72, Princes Street, Edinburgh on the second Wednesday of April, at eleven o'clock in the forenoon.

Candidates for examination are requested to communicate their intention to the Secretary, 121, George Street, ten days before the meeting.

Edinburgh, Feb. 23, 1856. JOHN MACKAY, *Secretary.*

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

Royal Institution, Thursday, 31st January, 1856.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

The SECRETARY, Mr. MERCER, delivered a lecture on the "Chemistry of Food." At its close, a lengthened discussion took place, in which most of the members present joined. The thanks of the meeting were passed to Mr. Mercer.

Royal Institution, Thursday, 14th February, 1856.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

Mr. E. WHALLEY was elected a Member of the Association.

The SECRETARY announced Donations to the Museum from Messrs. J. H. and S. Johnson and himself.

Mr. H. SUGDEN EVANS, F.C.S., delivered a lecture on the

NATURAL HISTORY OF CINCHONA BARK,

of which the following is an abstract:—

Cinchona bark, emphatically called "the gift of God," was unknown in Europe until the year 1638. It is one of the most valuable additions ever made to the Materia Medica,—possessing powers of curing or allaying one of the most common and formidable diseases to which mankind is heir, unimpeded by variations of climate or situation.

The origin of the first discovery of its virtues is buried in obscurity. Many accounts have been given, but the probability is that Europeans were taught the use

of bark first by the Indians. The first notice of its use in Europe was in 1640. The Countess of Cinchon, wife of the Viceroy of Peru, returning to Spain, brought with her some of the bark, and a glowing description of its virtues ; and in acknowledgment of the services thus conferred upon mankind, the genus yielding the bark has been named after her.

The value of the bark soon became known and appreciated. The Jesuits carried it with them to Rome, and employed it with great success in the cure of ague, &c., and hence it became generally known as Jesuits' bark.

The source whence Cinchona bark was derived, remained for a long time a mystery, until Condamine explored the region it came from. He was the first to describe in Europe the characters of the tree producing it, and in 1742, Linnæus, upon Condamine's descriptions, established the genus. Additions were gradually made by successive botanists to the history of the genus. J. de Jussieu visited the forests of Loxa and higher Peru, but from a concatenation of misfortunes, and the loss of reason on his return home in 1771, the valuable discoveries and observations this renowned botanist must have made, were lost to the world. Subsequently lower Peru was visited by Mutis, Ruiz, and Pavon; and through their labours, with those of Humboldt and Boupland, our knowledge was much advanced, new districts were discovered and explored, and the commerce in bark greatly increased. For much geographical knowledge respecting the bark districts, we are indebted to M. de Caldas, who, in the years 1802 to 1804, traversed the whole west of the Cordilleras, extending his research as far as Loxa. But most of the accurate knowledge we now possess of the source and origin of Cinchona barks, we owe to the labours of M. Weddell, who, during the years 1843 to 1847, explored the Peruvian bark districts, directing his attention to the study of the species yielding the most valuable sorts.

The Cinchona barks of commerce are the produce of various species of the genus Cinchona—a class of trees forming a large proportion of the immense forests clothing the declivities of the Andes, at an altitude of from 1,600 to 9,000 feet above the sea, and extending from 10° north, to 19° south latitude, with a mean temperature of 59° deg. Fahr. The more valuable species are comprised within the 4th° north, and 16th° south. The conditions necessary to the growth of Cinchonas, appear to be a mild temperature, with low barometric pressure.

The genus Cinchona is a member of the natural order Rubiaceæ or Cinchonaceæ of Lindley. Weddell divides the genus into two sections, Cinchonas and Cascarillas, according to the alkaloids found in the bark—those only being classed as Cinchonas which yield Cinchona alkaloids. M. de Caldas described 32 varieties ; Weddell reduces them to 21 species, of which only 12 perhaps comprise the barks of commerce.

Much confusion has existed regarding the source and origin of the commercial varieties, and this arising chiefly from the difficulties experienced in correctly ascertaining the region producing them, and the conflicting accounts and names given to the barks of the same species in different districts.

Many means of classification have been adopted; these have hitherto only helped to complicate. Thus with regard to colour, we have had the yellow, red, and white barks, but we find the yellow bark of one province, the red of another, and so with the orange and white. Some, too, derive the colour from the exterior of the bark, others from the coloured powder it produces, and hence confusion, and fallacious conclusions are arrived at.

Barks are distinguished by the names of places also; thus we have Loxa, Carabaya, &c., representing the districts producing the bark; they are equivalent to the manufacturer's name, indicating, to a certain extent, the quality of the bark. Such names, on the other hand, as Lima, Carthagena, &c., carry no information with them, further than the port of shipment, and in no way indicate the quality.

The fracture and microscopic structure seem to be of the greatest general use in determining the value of barks, since experience has shown that between the structure and chemical composition, a very close analogy exists. Not only is the microscopic structure likely to afford the most satisfactory criterion of the chemical value of barks, but it will probably furnish the readiest and most accurate means of determining their botanical origin. Mr. Evans intimated that he was at present occupied with an inquiry of this kind, and hoped shortly to lay his results before the Society.

He then proceeded to describe in detail the very valuable and unique collection of

Cinchona barks presented to the Museum of this Society through the kindness of J. E. Howard, Esq. For the convenience of description, he divided the collection geographically, according to the states producing, and the districts yielding, the commercial kinds.

After describing the specimens on the table (26 in number) and drawing attention to the doubts which have existed with regard to the origin of some species, and describing the method by which the bark-peelers are guided to the trees yielding the various kinds, and the process of collecting and preserving the bark, Mr. Evans concluded his lecture, by impressing on the members present the great value and importance of possessing in their Museum such collections as this ; that in the case of Cinchona barks especially, it is almost impossible for an inexperienced observer to distinguish one kind from another (the C. Calisaya, for instance, from C. Scrohiculata) simply by reference to written descriptions or drawings, yet when seen side by side, authentically labelled, it became a matter of comparative ease.

Mr. B. C. Rowland then exhibited his photographic enlarging apparatus, which consists of an oblong box, eighteen inches long by eight broad and eight deep, fitted up at one end with an arrangement for gas, oil, or oxy-hydrogen, and a silver reflector at the back, similar to the magic lantern. In the middle of this box are fixed two plano-convex condensers, four inches in diameter, and with their convex sides almost touching. Immediately in front of these condensers is placed, by means of a slide passing through the side of the box, the photograph to be copied, and in front of this again is screwed, in a moveable tube to focus by, the achromatic lens of a quarter plate camera, when portraits the size of a shilling may be enlarged, with perfect accuracy and detail, to life size. Some excellent specimens thus enlarged were exhibited to the meeting. When required for micro-photographic purposes, the lens of the microscope replaces that of the camera, the manipulation in all other respects being the same. By means of this inexpensive apparatus, many interesting experiments may be performed, not the least pleasing of which is the copying of landscapes, made transparent by means of bichloride of mercury and ammonia, and which may be used for the decoration of lamps or windows. Many of the French stereoscopic slides are made in this way.

The meeting was highly pleased with Mr. Rowland's explanation of his ingenious apparatus, the applicability of which for copying and enlarging photographs, and also for exhibiting microscopic specimens, he practically showed by a number of experiments.

At the close of the proceedings, the thanks of the meeting were voted to Messrs. Evans and Rowland for their valuable communications, and also to the Donors to the Museum.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

The usual monthly meeting of the Society was held in the Lecture Room, 4, Victoria Street, on Friday, February 1st,

MR. WOOLLEY, PRESIDENT, IN THE CHAIR ;

who, in commencing the business of the meeting, said he thought it was desirable some determination should be come to by the trade generally respecting the recognition of chloroform made from methylated spirit, as, if equally pure with that made from spirit of wine, there was no reason why it should not be generally sold.

Mr. Ransome said he had formerly prepared chloroform from pyroxylic spirit alone, and had always found the product quite pure ; therefore he could see no reason why it should not be pure when made from methylated spirit.

The President said he had been at a meeting of the Literary and Philosophical Society, when a paper was read by Dr. Gerland on the detection of cocculus indicus in beer. The Doctor had had six samples of beer sent to him for analysis, in four of which he had detected the presence of picrotoxine ; but whether the beer had been purposely adulterated with cocculus indicus, for the purpose of ascertaining the possibility of its detection, or whether they were true commercial samples of beer, could not be elicited. The mode of examination adopted, was to evaporate the beer to dryness, treat the residue with ether, which dissolved out the picrotoxine, and by evaporation deposited it in a crystalline state.

Some conversation followed on the late poisoning cases, and the sale of poisons generally, in the course of which it was observed that pharmaceutists could not be too cautious in regard to their sale; and it was suggested, that if it were the universal practice to register every sale of at least the more important poisons, it would enable the chemist to say with certainty whether he had sold poison to any suspected party in a case of poisoning, and would also operate as a check on any person applying for it for a criminal purpose.

Mr. Ransome read a paper on Photography, and commenced by saying, that though at first sight it might scarcely be considered a subject for Pharmaceutical Chemists, yet, as Photography was essentially a chemical process, and almost all Chemists were more or less brought into contact with Photographers, he thought a short history of the art, illustrated by a few practical experiments, might be interesting to the Members generally.

After alluding to the knowledge possessed by the Alchemists of the action of light on chloride of silver, the experiments of Davy and Wedgewood in the early part of the present century, and the failure of their attempts to obtain impressions of the image cast by the camera obscura, he stated that Niepce and Daguerre in France, and Fox Talbot in our own country about the year 1839, discovered means of developing and fixing the latent image upon chemically prepared surfaces, which had been exposed to the action of a light not sufficiently powerful to produce a visible picture.

M. Daguerre used silver plates, which, by exposure to the vapour of iodine, had become coated with a thin film of iodide of silver, and developed the picture by exposing the plate to the vapour of mercury, which condensed upon those parts that had been acted on by the light.

Mr. Talbot operated on paper covered with a layer of precipitated iodide of silver, and rendered sensitive to light by means of aceto-nitrate of silver and gallic acid; this was developed by gallic acid, the strongly lighted parts of the picture being blackened by the reduction of the silver salt to the state of suboxide by the reducing agency of the gallic acid.

The difficulty of obtaining paper of uniform texture led to experiments upon other substances, and Sir John Herschel obtained pictures upon albumen spread evenly over the surface of glass. Mr. Archer, in 1851, applied the transparent film obtained by allowing an etherial solution of gun cotton or pyroxyline to evaporate on a plate of glass, to photography, as affording an uniform surface through which the sensitive salts may be diffused.

Mr. Ransome next explained the practical details of the Daguerreotype and Calotype processes, illustrating the latter by preparing the paper and developing the picture in the room. After alluding to the waxed paper and albumen processes, he described the preparation of gun-cotton or pyroxyline, and exhibited specimens of the soluble and insoluble varieties, giving formulæ for preparing and iodizing collodion. He then coated a glass plate with iodized collodion, excited it in the nitrate of silver bath, and copied an albumen picture by gas-light, showing the mode of developing and fixing the image.

After a short account of the mode of preparing paper for positive printing, and a comparison of the advantages of the processes commonly in use, he concluded a very interesting lecture by mentioning some of the practically useful applications of the art.

Mr. J. Taylor said he felt sure all the Members present must have been very much interested by the paper Mr. Ransome had just read, and proposed that the thanks of the meeting be given to him.

Mr. Roberton seconded the motion, and observed that a knowledge of photography and the chemicals employed in the art, was daily becoming of greater importance to the pharmaceutist, both in a scientific and commercial point of view. The motion was carried unanimously.

A conversation followed, in which various applications of the art were alluded to, more particularly those of copying microscopic objects and chemical or other apparatus, for the engraver to work from, instead of pencil or other drawings.

The Photographic Dissolving Views, now exhibiting at the Manchester Mechanics' Institution, were also noticed as being highly interesting, and the first of the kind ever exhibited.

ORIGINAL AND EXTRACTED ARTICLES.

THE DILUTED ACIDS OF THE PHARMACOPŒIA.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Dear Sir,—If I may take the liberty of making such a remark, I would say, that with a few exceptions, those who took part in the discussion on the Pharmacopœial dilute acids at the last meeting, appeared to speak from immediate impressions rather than from a deliberate investigation of the subject, and from this cause, perhaps, arose the inconclusiveness of the discussion. In apology it should be remembered, that Mr. Squire's communication was announced in the January number of the Journal* as upon "Acetic Acid," and consequently attention was misdirected, which only proves the advisability of forewarning the Members as explicitly as possible of the exact subject of these very important and interesting inquiries, which we may expect will continue through all the divisions of the Pharmacopœial preparations. I wish to call attention to some matters which, from the above cause, were not noticed upon that occasion. And, first, in point of methodical arrangement, as to the possibility of including the alkaline solutions in either of the two systems under consideration. This will be seen by the following table:

	No. of grains weight in 1000 grains measure.	Equivalent.
Liq. Ammon. P. L.....	100	17
" Potassæ "	59.2	48
" Sodæ "	47.2	32

The liquor ammonia already agrees with the scale proposed by Mr. Squire while it bears no simple relation to the other. The liquor potassæ does not harmonize with either, and the liquor sodæ is even further off than the last named.

It then occurred to me to take liquor potassæ† as a standard, and to endeavour to reduce all the acids and alkalies to an equal saturating volume, in the hope that a slight modification of the liq. cornu cervi (adopting this as the representative of the ammonia solutions) would enable me to bring it into the category. It is not with any satisfaction in the result that I furnish a statement of the changes which this would involve, but they are sufficiently germane to the inquiry to be mentioned here.

The liq. potassæ remaining as at present:

1000 vols.		would become	
	Liq. cornu cervi		2321 vols.
	" sodæ		1195 "
	Ac. acet. dil.		682 "
	" hydchl. dil.		2000 "
	" nitric "		1846 "
	" phosph. "		1579 "
	" sulphc. "		2581 "

This implies an average diminution of the strength of the dilute acids (with exception of acetic) of fifty per cent., in which perhaps there would be no inconvenience, neither, probably, would there be any objection to the alteration of the liq. sodæ, which is in very limited employment, but it is to be feared that the alteration of the liq. cornu cervi would be inadmissible, added to which the basis of the whole arrangement is artificial, and we should have no guide for the saturating power of these solutions except *inter se*. I therefore conclude that the endeavour to bring the acid and alkaline solutions of the New Pharmacopœia to an equal volumetric standard is impracticable, and that we must rest satisfied

* The notice was correct in the February number.—Ed.

† As being necessarily made of a certain strength.

to deal with the acids separately from the alkalies, and probably (though enough for the day should be the evil thereof) with the alkalies individually rather than as a class. It would still remain for us to determine whether the equal saturating volumes or the constant per-centage of dry acid should be our guide for fixing the strength of the dilute acids when narrowed to these limits; and I think that convenience and philosophical considerations are both in favour of the plan for making 1000 grain measures contain as many grains of dry acid as correspond to its equivalent number. It is to be remembered that this is the law upon which nature has chosen to operate, that combination occurs between particles represented by very variable weights, and it would seem rational for us, in preparing solutions of these agents, to aim at having a corresponding diffusion of corresponding particles, rather than a careful assimilation of weights, which simply indicate that the agents we desire to assimilate have been disposed with a studious irregularity.

I am, dear Sir, yours very truly,

R. W. Giles.

NOTES ON THE MATERIA MEDICA OF THE PARIS EXHIBITION, 1855.

BY W. HAMILTON, M.B.

(*Ph. Journ.*, Jan., 1856, page 332 and seq.)

Among the articles exhibited is one which merits a little more notice than the brief account given of it in the Journal, and which of itself suggests the doubt which prompts the present communication.

"447.—Ipomœa Starch, prepared from a species of *Ipomœa*,* the enormous root of a single plant sometimes yielding from 20 to 50lbs. of starch. It grows in some parts of Jamaica in very great abundance, but the fæcula obtained from it, is not much known." Upon this notice is appended a brief note, of which the following is a copy:—

"* Printed in the Catalogue *Ipomœa Horsfaldiæ*, a name we cannot identify. We are assured, however, that it is *not* the *Ipomœa Horsfalliæ* of Hooker."

Such is the account as I find it chronicled in the pages of the Journal, and from the doubt of identity indicated in the note, I am induced to venture a suggestion as to the farina in question being the product of one of the family of Scitamineæ, and not to one of the Convolvulaceæ. We have undoubtedly in that family examples of plants affording esculent roots, as the *Batatas edulis* [*Convolvulus Batatas*]; but although these roots are esculent, they are no more tuberous than the fusiform roots of the carrot or parsnip, and are merely an enlargement of the root itself, partaking in no respect of the peculiar character of a tuber, and being destitute of those reproductive buds familiar to all of us in what are known in the common potato by the name of eyes.

But while I am unacquainted with a true Convolvulus or Ipomœa, producing an undoubted tuber, I am tempted to suspect the possibility of the products of a Canna—the *C. Achira*, Loud.—being confounded with those of this apocryphal Ipomœa. The C. Achira grows in a rich soil to a large size, shooting up stems of above six feet in height, crowned with a blazing spike of the most beautifnl crimson blossoms, while the tubers attain an immense development; and some which I received about seventeen years ago from Mr. Olphers, of St. Kitt's, accompanied by some pounds of the farina, equalled in bulk the human head, and might, no doubt, under favourable circumstances, attain the weight indicated in the notice. Of the valuable properties of this farina, I have a living proof in my son, now serving in the Pacific, on board H.M.S. *Monarch*, who was brought up entirely on this food as long as the supply received lasted. This is the farina known in commerce by the unmeaning name of *Tous les Mois*, from the circumstance common to many other tropical plants, of flowering during every month of the year.

Having raised plants in Pantey's nursery from some of the St. Kitt's tubers, I at once saw that they belonged to the family of *scitamineæ*, and, although they did not flower here, I was satisfied that they belonged to the genus *canna*, and appearing to be a nondescript species, it was provisionally named by the late lamented Loudon, in his *Hortus Britannicus*,—*canna achira*, from its being believed to be the same with the *achira*, an esculent root of the Spanish Main.

Among the products of Jamaica catalogued in the Paris Exhibition, I was disappointed at finding no mention made of the *Ipomœa dissecta* or *Noyeau vine*, a beautiful climber, forming elegant arbours, and abounding in its leaves, stems, and immature capsules, with hydrocyanic acid, which might no doubt be advantageously and economically manufactured from it for commercial purposes. I have tasted noyeau made from this plant by my late kind and philanthropic friend James Webbe Tobin, Esq., at Nevis. The noyeau vine is of rapid growth as well as great elegance, and produces abundance of white blossoms. I had previously observed it at Barbadoes.

14, *Octagon*, *Plymouth*, 21*st February*, 1856.

ON THE PREPARATION OF OXYGEN.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Laboratory, *Museum of Practical Geology*, *Feb.* 12, 1856.

Sir,—Seeing some remarks in your Journal of Feb. 1, by Mr. G. Hornsby, on the "Preparation of Oxygen," in which the author mentions the sudden disengagement of oxygen at a certain point on heating a mixture of chlorate of potash and binoxide of manganese, which he attributes to "a certain electrical action set up by the solid binoxide of manganese particles in the fluid chlorate," hinting at the probable formation of ozone,—I beg to offer a few remarks on the subject.

Your correspondent's observation is no novelty; all students of practical chemistry are aware of the peculiar manner in which oxygen is disengaged from chlorate of potash, either when alone or mixed with binoxide of manganese.

If chlorate of potash alone, previously dried and powdered, be introduced into a Florence flask with as wide a delivery tube as possible, and then heated over an argand-gas flame, the chlorate fuses, and a small quantity of oxygen is disengaged, but very slowly and gradually, and if no higher temperature be applied, scarcely any more rapid evolution of gas is obtained; but if the temperature be now raised by substituting for the argand flame a wire gauze air-gas flame, which is capable of speedily raising the lower part of the flask to a red heat, then suddenly a rapid evolution of the gas sets in, and unless great care is taken as soon as this is observed to lower the temperature, the amount of oxygen evolved thus suddenly is so great, that inevitably the cork and delivery tube are expelled with violence from the neck of the flask.

At the moment of this sudden disengagement of the oxygen, it has often appeared to me to be in a peculiarly active state, for, in addition to its suddenly great amount, it appears then to possess remarkably energetic oxidizing powers; for, if any particles of organic matter, dust, fragments of wood or cork, be accidently present in the chlorate (and this is generally the case), they are suddenly deflagrated, producing the "brilliant sparkling" mentioned by Mr. Hornsby; but besides this, unless, as I before mentioned, great care be taken to regulate the disengagement of gas by diminishing the heat, combustion of the cork takes place in the neck of the flask, and I have frequently seen the cork in a lively state of combustion, previously to its forcible expulsion.

The explanation of the sudden disengagement of oxygen at the more elevated temperature given by Scrullas (*Annales de Chim. de Physique*, xlvi., 323) is, that at the lower temperature, 356° C, the chlorate of potash is resolved into perchlorate and free oxygen, and that it is only at the more elevated temperature, at a red heat in fact, that the perchlorate is decomposed, all the oxygen being

evolved, and only chloride of potassium remaining, so that the reaction consists of two stages, the former, in which the chlorate is converted into perchlorate, with the evolution of oxygen and the formation of a certain quantity of chloride, thus:

$$2\,(KO, Cl\,O_5) = KO, Cl\,O_7 + K\,Cl + O_4$$
$$\text{Or } [\,2\,K\,Cl\,O_6 = K\,Cl\,O_8 + K\,Cl + O_4]$$

and the latter, when the perchlorate is itself resolved into chloride of potassium and oxygen,

$$KO, Cl\,O_7 = K\,Cl + O_8$$
$$\text{Or } [K\,Cl\,O_8 = K\,Cl + O_8].$$

This view has, moreover, been confirmed by M. Millon, who has shown, by collecting in a graduated vessel the oxygen evolved by a known weight of the chlorate, that the quantites of oxygen liberated in these two stages respectively correspond to those indicated by the formulæ given above.

The remarkable activity of the gas generated during the latter stage of the operation may be due to several causes, but I have only suggestions to offer on this point. It may be that oxygen, like other gases, possesses a peculiar state of activity at the moment of its disengagement from a compound, being in what is known to Chemists as the "nascent condition;" or possibly, the solid oxygen contained in compounds may be ozone, which only after its liberation is converted into ordinary oxygen, and it may be the ozone present in the gas which confers upon it its preternatural activity; or the phenomena mentioned above may be due merely to the large quantity of oxygen liberated in a given time, and also to its elevated temperature; for it must be remembered that a red heat has been applied to decompose the perchlorate, and therefore the evolved oxygen must have a very high temperature. However, I am inclined to believe that the oxygen is in some peculiar state, for it appears at that moment quite opaque, as if the flask were filled with steam, which of course cannot be the case.

The fact that the liberation of the oxygen from the chlorate takes place, if certain solid bodies, *e. g.* binoxide of manganese in powder, be mixed with the chlorate, at a much lower temperature than when the chlorate alone is used, has also been long known. It was originally suggested by Döbereiner; and the mixture which I have found most convenient consists of about ten parts of chlorate to one part of binoxide. Döbereiner showed that during the process the binoxide of manganese undergoes no change, acting merely by offering a number of points of contact from which the gas is disengaged, in the same way as finely divided insoluble bodies in general promote the boiling of water and other liquids.

Of course, almost any other metallic oxide which does not enter into chemical combination with either the chlorate or the products of its decomposition, may be employed instead of the binoxide of manganese—*e. g.* oxide of copper, as suggested by Mitscherlich, or sesquioxide of iron, or sesquioxide of chromium answer perfectly well; of course, in such a case a cheap substance is desirable, otherwise we might use oxide of silver, which would not only act mechanically as above mentioned, but would have the advantage of also giving off its own oxygen at the same time. Oxide of lead cannot be employed with advantage, because it is liable to become fused at the temperature necessarily employed, and by thus running into lumps its mechanical action is lost. Oxide of mercury would offer the same advantage as the oxide of silver, were it not that the metal resulting from the decomposition is fluid, and thus the mechanical action of the solid particles from the moment of its decomposition is lost.

Another point I have also observed, that when the chlorate is mixed with binoxide of manganese, sesquioxide of iron, or oxide of copper, still the same distinction between the two stages of the process is recognizable as when the chlorate alone is used. It is true that the whole action takes place at a far lower temperature, yet still, notwithstanding this, there is a well marked line of demarcation in the phenomena, between the original first decomposition of the

chlorate (which in this case takes place at a comparatively very low temperature) and the splitting up of the perchlorate at the more elevated temperature. The process is by no means that gradual and regular decomposition and evolution of gas which might be supposed, by referring to most of the manuals, consequently I have always found it desirable to employ as wide a delivery tube as possible, or even to fit directly over the neck of the flask a piece of caoutchouc tubing, three-fourths of an inch in diameter, passing directly into the gas-holder.

I am aware that in these remarks there is very little that is new, but I was led to suppose, from the perusal of your correspondent's letter, that the few preceding practical observations might be of service to some of your readers.

Your obedient servant,

Henry M. Witt,

Assistant Chemist to the Department of Science and Art.

P.S. Since writing the above, I find that Prof. Schönbein has observed that ozone is contained in the oxygen, generated by the action of heat on a mixture of binoxide of manganese and chlorate of potash ; but that a larger proportion of this body is developed in the preparation of oxygen by heating chromate of potash with sulphuric acid than by any other process. These experiments I have repeated, and by testing the gas collected as usual in cylinders over water, with Schönbein's test papers, containing starch and iodide of potassium, have arrived at the same conclusion. I have, moreover, observed, as was to be expected, that far more ozone is present in the last portions of the gas disengaged from chlorate of potash, *i. e.* during the decomposition of the perchlorate.

ON THE ELECTRICAL RELATIONS OF LEAD AND ANTIMONY IN VARIOUS CONDUCTING LIQUIDS.

BY G. GORE, ESQ.

The following experiments were made with a view of ascertaining the general electrical relations of lead and antimony to each other, in conducting liquids, at 60° Fahr., and to determine in what classes of liquids each was generally electro-positive to the other at that temperature.

In each of the experiments the liquid was at 60° Fahr., the pieces of metal were of the same size and form, and immersed equal depths and at uniform distances from each other in the liquids.

Lead was positive to antimony at 60° Fahr., in each of the following liquids: In a solution composed of ten grains of boracic acid, dissolved in one ounce of water. In a saturated aqueous solution of boracic acid. In a strong aqueous solution of phosphoric acid. In a solution composed of fifty grains of phosphoric acid, dissolved in one ounce of water. Strongly positive in commercial oil of vitriol. Strongly positive in commercial oil of vitriol, when gradually diluted to a considerable extent. Strongly positive in sulphate of boracic acid. Powerfully positive in hydrochloric acid. Very strongly positive in hydrochloric acid, when gradually diluted to a great extent. Strongly positive in hydrofluoric acid; also in the same acid, when very much diluted. Powerfully positive in strong nitric acid, and in the same acid when gradually much diluted. Positive in aqueous ammonia. In a saturated aqueous solution of sesquicarbonate of ammonia. In a saturated aqueous solution of phosphate of ammonia. In an aqueous solution of sulphate of ammonia, whether saturated or dilute. In a saturated aqueous solution of hydrochlorate of ammonia. In a strong aqueous solution of nitrate of ammonia. In a saturated aqueous solution of tartrate of ammonia; and in a strong aqueous solution of acetate of ammonia.

Lead was also positive to antimony in a saturated aqueous solution of carbonate of potash. In a saturated aqueous solution of bicarbonate of potash. In a saturated aqueous solution of sulphite of potash. In a strong aqueous solution of carbosulphide of potassium. In a saturated aqueous solution of

sulphate of potash. In a saturated aqueous solution of iodide of potassium. In a saturated aqueous solution of chloride of potassium. In a saturated aqueous solution of hypochlorite of potash. In a saturated aqueous solution of chlorate of potash. In a saturated aqueous solution of nitrate of potash. In a strong aqueous solution of cyanide of potassium. In a strong aqueous solution of mellonide of potassium. In a strong aqueous solution of sulphocyanide of potassium. In a strong aqueous solution of acetate of potash. In a strong aqueous solution of tartrate of potash. In a saturated aqueous solution of bitartrate of potash. Very strongly in a saturated aqueous solution of oxalate of potash; also very strongly in a saturated aqueous solution of citrate of potash.

It was positive to antimony in a saturated aqueous solution of carbonate of soda. In a saturated aqueous solution of bicarbonate of soda. In a saturated aqueous solution of borate of soda. In a saturated aqueous solution of diphosphate of soda. In a saturated aqueous solution of pyrophosphate of soda. In a saturated aqueous solution of hyposulphite of soda. In a saturated aqueous solution of sulphate of soda. In a saturated aqueous solution of nitrate of soda. In a saturated aqueous solution of microcosmic salt. In a saturated aqueous solution of acetate of soda. Very strongly in a saturated aqueous solution of oxalate of soda. Very strongly in a saturated aqueous solution of citrate of soda. In a saturated aqueous solution of tartrate of soda; also in a saturated aqueous solution of tartrate of soda and potash.

It was positive to antimony in a saturated aqueous solution of chloride of barium. In a saturated aqueous solution of nitrate of baryta. In a solution of baryta in caustic potash and water. In a strong aqueous solution of acetate of baryta. In a saturated aqueous solution of chloride of strontium. In a saturated aqueous solution of nitrate of strontia. In an aqueous solution of chloride of calcium. Very strongly in an aqueous solution of hypochlorite of lime. In a saturated solution of chloride of calcium in alcohol. In a saturated aqueous solution of nitrate of lime. In a saturated solution of caustic lime in caustic potash and water. In a saturated aqueous solution of sulphate of magnesia. In a strong aqueous solution of chloride of magnesia. In a saturated solution of magnesia in caustic potash and water. Very strongly in a strong solution of chloride of aluminium. In a saturated solution of alumina in caustic potash and water. In a saturated aqueous solution of potash alum. In an aqueous solution of acetate of alumina. Very strongly in an aqueous solution of chloride of silicium; and in an aqueous solution of monosilicate of potash, lead was first negative and then positive to antimony.

Lead was also positive in an aqueous solution of chromate of potash. In a saturated aqueous solution of bichromate of potash. In an aqueous solution of arseniate of potash, lead and antimony were electrically neutral. Lead was very strongly positive in a solution of sulphate of manganese containing free acid. Also very strongly positive in an aqueous solution of chloride of manganese containing free acid. Also very strongly in an aqueous solution of terchloride of antimony. Very strongly in an aqueous solution of terchloride of antimony and hydrochlorate of ammonia. Very strongly in an aqueous solution of the mixed chlorides of manganese and antimony. In an aqueous solution of oxalate of potash and antimony, lead was negative at first and positive afterwards. Lead was very strongly positive in a strong aqueous solution of sulphate of bismuth. In a strong aqueous solution of chloride of bismuth. In a strong aqueous solution of nitrate of bismuth, with free acid; and in a strong aqueous solution of the mixed chlorides of bismuth and ammonium.

Lead was very strongly positive in a saturated aqueous solution of sulphate of zinc. Very strongly in a saturated aqueous solution of chloride of zinc. Very strongly in a saturated aqueous solution of nitrate of zinc. Very strongly in a saturated aqueous solution of ammonio-chloride of zinc. Very strongly in a solution composed of ferrocyanide of zinc, dissolved in an aqueous solution of

sesquicarbonate of ammonia. Very strongly in an aqueous solution of acetate of zinc. Very strongly in an aqueous solution of bichloride of tin. Very strongly in a solution, formed by dissolving tin in aqua regia. In an aqueous solution of protochloride of tin. Very strongly in a solution, formed by dissolving terchloride of antimony and protochloride of tin in water. Very strongly in an aqueous solution of the mixed chlorides of tin and bismuth. In an aqueous solution of bitartrate of tin. In an aqueous solution of peracetate of tin. In an aqueous solution of hyponitrite of lead. In an aqueous solution of nitrate of lead. In an aqueous solution of acetate of lead. Very strongly in an aqueous solution of persulphate of iron.

Also in an aqueous solution of ferrocyanide of potassium. Very strongly in an aqueous solution of ferridcyanide of potassium. Very strongly in an aqueous solution of oxalate of iron and oxalic acid. Very strongly in an aqueous solution of oxalate of iron and potash. Very strongly in an aqueous solution of chloride of cobalt. Very strongly in an aqueous solution of nitrate of cobalt. In aqueous hydrocyanic acid. In a saturated solution of tartaric acid. Very strongly in a saturated solution of oxalic acid. In a saturated solution of citric acid. In dilute formic acid. Very strongly in a solution of croconate of potash in dilute formic acid. In an aqueous solution of acetic acid. In an aqueous solution of pyrogallic acid, lead and antimony were neutral.

Antimony was positive to lead at 60° Fahr., powerfully in an aqueous solution of hydrosulphate of ammonia; also when it was diluted with water to a considerable extent. Powerfully in an aqueous solution of monosulphide of potassium. Also powerfully in solutions, formed by dissolving sulphide of antimony in aqueous solutions, either of hydrosulphate of ammonia or monosulphide of potassium; but most strongly in the former solution.

From these experiments it is evident that lead is a far more electro-positive metal than antimony, in conducting liquids generally; for out of nearly 120 different liquids of the most varied chemical characters, antimony was positive to lead in only about three or four—namely, in aqueous solutions of alkaline sulphides.

Birmingham.

THE METEOROLOGY OF THE WEST OF LONDON.

From the Daily Observations taken at St. Mary's Hospital during the Year 1855.

BY MR. COPNEY.

INTRODUCTORY REMARKS.

The weather has always been an unfailing source of interest and conversation. Its influence upon the health and spirits is more or less known to all. Who has not felt the cheering effect of a fine sunny morning in the spring of the year, showing itself in the elastic tread and quickened step of the healthy, or the brightened eye of the sick? And who, in this climate of ours, does not know too well the depressing tendency of a foggy, dull day?

The changing character of the weather is, doubtlessly, regulated by unchanging laws; to inform ourselves of these, is one of the objects of meteorology. It is a branch of natural science, therefore, which, while it offers full scope for that love of knowledge which is characteristic of the human mind, furnishes a ready answer to the question so often proposed, and with so much apparent reason,—*Cui bono?*

A formidable array of figures, representing the various elements of observation, is not certainly very inviting at first sight; but the facts which they put us in possession of, give to them an interest not excelled by most other subjects.

The desirability of prosecuting meteorological researches is daily becoming more apparent, especially in regard to those periodic attacks of epidemic disease which have told with so much effect upon the mortality of the people. Defective sewerage, habits of uncleanliness, imperfect ventilation, impure water and unwholesome food, are obviously productive of great evil, but they yet leave much to be explained by natural causes. The condition of the air we breathe, in reference to its pressure,

temperature, humidity, electricity, to ozone, &c., claims our attention as favouring or retarding the career, more especially of that wide-spread and destructive disease which in 1849 and 1854, summarily carried off so many of our fellow-creatures. In the "Report of the Meteorology of London" made to the General Board of Health, Mr. Glaisher thus writes:—"I have little hesitation in saying, that were the meteorology of our towns carefully ascertained and collated with that of the metropolis, and both together with that of the country generally, of which last I have a foundation of many years' continuous observations, that in a short time we should be in a condition to elucidate a clear insight into the meteorological causes of cholera, influenza, and many phases of disease which now burst upon us with the suddenness and devastating power of a divine and wrathful visitation." Hopeful and encouraging as this may be, coming from so high an authority, all, or nearly all, remains to be done, nor do we know the precise value of the knowledge already possessed. Referring to the facts eliminated by Mr. Glaisher's report, the Medical Council of the General Board of Health in its "Report of the Committee for Scientific Inquiries," says, "The pathological meaning of many atmospheric variations, at least in their minor degrees, is hitherto quite unknown. What effect is produced on human life by an inch rise or fall in the barometer, by fluctuation of humidity and dew-point, even by seasons of non-average temperature, is very imperfectly measured." And again, of fog, mist, and haze, "in their mere hygrometrical relations, we know nothing to affect life, but it is requisite to remember that when these hang over districts of London, condensed in their ascent from the 'simmering' river and filth-sodden soil, they represent not mere clouds of aqueous vapours, but, too probably, other products of terrestrial exhalation, delayed in their transit to space, and withheld from the diffusion they had commenced." Of the effect of calm, the same report speaks somewhat more positively. "As individuals suffer their temporary inconvenience when detained in unventilated rooms, and grow poisoned and cachectic if such be their habit of life, so, in recesses of the earth's surface, where, amid great mountain chains the pended air lies unruffled by free whirls of wind, whole communities abort in the stagnant atmosphere, and beget a cretin, goitrous population. In respect of local impurities and the mischief they may engender, no miasm can survive an adequate commixture with air, and in relation to the severity of epidemic disease, it is impossible to doubt that the more or less vehemence of aërial circulation is a variant of the utmost importance."

GEOGRAPHICAL POSITION,

Latitude 56° 31′ 0″24 N.; Longitude 0° 10′ 19″12 W.

Enumeration and brief description of the instruments employed in the observations:—

1. A barometer, made by Barrow, provided with a thermometer to show the temperature of the mercury. The diameter of the tube is 0.32 inch, and the correction for capillarity + 0.013. Its index error is + 0.020, determined by Mr. Glaisher.

2. A thermometer indicating the temperature of the air in the shade (dry bulb thermometer).

3. A thermometer, having its bulb wetted, indicating the temperature of evaporation (wet bulb thermometer).

4. A spirit thermometer, within which is placed an index, which recedes as the temperature falls, but retains its position as the temperature increases, indicating the lowest temperature by night (minimum thermometer).

5. A mercurial thermometer, the tube adjoining the bulb being bent so as to prevent the return of the mercurial column as the temperature falls, indicating the highest temperature by day in the shade (maximum thermometer). These four thermometers are placed four feet above the ground in the open air, and are protected from radiation and rain. The two former are placed vertically, the two latter horizontally.

6. A mercurial thermometer, having its bulb blackened, and the tube bent like the one in the shade, placed horizontally one foot above the ground, indicating the highest temperature in the rays of the sun.

7. A spirit thermometer provided with an index, placed upon the ground or grass, indicating the lowest temperature by night at the surface. (The whole of these thermometers were made by Negretti and Zambra, and having been tested by Mr. Glaisher to determine their index errors, are perfectly reliable.)

8. Glaisher's rain gauge, placed upon the ground.
9. A wind vane, furnished with a dial plate.
10. A gold leaf electrometer.
11. Ozone test-papers (Moffatt's and Schönbein's).

Times of observation, 9h. a.m. and 3h. p.m. daily.

ATMOSPHERIC PRESSURE.

(Readings of Barometer corrected for Index Error, Capillarity, and Diurnal Range, and Reduced to the constant temperature of 32°.0 F.

	Mean Reading.	Highest Reading.	Lowest Reading.	Range.
	in.	in.	in.	in.
January	30.028	30.513	29.340	1.173
February	29.645	29.984	29.219	0.765
March	29.588	30.396	28.805	1.591
April	29.986	30.449	29.178	1.271
May	29.692	30.037	29.271	0.766
June	29.896	30.279	29.208	1.071
July	29.790	30.132	29.414	0.718
August	29.907	30.241	29.575	0.666
September	30.014	30.379	29.361	1.018
October.....	29.552	30.118	29.021	1.097
November.....	29.919	30.244	29.448	0.796
December	29.736	30.234	29.012	1.222
1855.	29.813	30.513	28.805	1.708

The mean reading of the barometer (29.813) is inclusive of the elastic force of aqueous vapour; if the increase in the height of the mercurial column, occasioned by this element (*i.e.* 0.303 in.) be subtracted, the mean pressure of dry air becomes 29.510 inches.

The barometer has an altitude of 125.10 feet above the mean sea level, if the correction for this be applied (+0.141 in.) the mean pressure of the air becomes 29.954 inches.

Note.—The mean for the year is the mean of the corrected monthly readings, which latter are thus obtained: the arithmetical means of the 9h. a.m. and 3h. p.m. observations are added together and the sum divided by two.

The mean reading of the barometer was lower by 0.072 in. than during 1854.

In Mr. Glaisher's report before referred to, the mean height of the barometer, during a period of thirteen years, as determined at the Royal Observatory, Greenwich, and at St John's Wood, by George Leach, Esq., is stated to be 29.939 inches at the level of the sea. The difference between this and the height at the Hospital for the past year is 0.015 in.

The highest reading (30.513) occurred on the 12th of January.

The lowest reading (28.805) occurred on the 22nd of March.

The mean reading of the barometer was highest during January, and lowest during October.

TEMPERATURE.

(Readings corrected for Index Error and Diurnal Range).

	MONTHLY MEANS.						RANGE.			
	Dry Bulb Therm.	Wet Bulb Therm.	Max. in the Shade.	Min. during Night.	Mean Temp.	Mean Temp. of Evaporn.	Highest Reading by Day.	Lowest Reading by Night.	Monthly Range.	Daily Range.
	°	°	°	°	°	°	°	°	°	°
January ...	35.6	34.6	38.8	32.8	35.7	34.7	52.2	22.8	29.4	6.0
February ..	30.2	29.2	35.6	26.4	30.6	29.6	49.4	16.4	33.0	9.2
March	38.1	36.1	45.1	32.5	38.5	36.5	56.5	26.0	30.5	12.6
April	46.0	44.5	55.9	37.1	46.3	44.8	70.8	25.0	45.8	18.8
May.....	48.8	45.9	58.7	40.2	49.2	46.3	81.8	32.0	49.8	18.5
June	56.4	51.4	67.2	48.6	57.2	52.2	86.0	39.8	46.2	18.6
July.....	62.1	57.9	71.6	57.1	63.3	59.1	82.8	49.7	33.1	14.5
August ...	62.9	57.4	72.2	53.7	63.0	57.5	79.6	48.8	30.8	18.5
September.	57.6	54.2	68.9	49.2	58.4	55.0	74.8	40.2	34.6	19.7
October ...	52.3	50.1	58.5	46.1	52.3	50.1	67.8	36.2	31.6	12.4
November..	41.9	40.5	46.7	38.6	42.3	40.9	57.8	28.3	29.5	8.1
December..	37.6	35.8	42.4	33.1	37.7	35.9	53.2	19.8	33.4	9.3
1855.	47.5	44.8	55.1	41.3	47.9	45.2	86.0	16.4	69.6*	13.9

The mean temperature (47.9) is lower by 2°.3 than that of the preceding year at this hospital. The mean temperature at St. Thomas's Hospital is stated by Dr. R. D. Thomson to be 48°.2 during the same period, or 0°.3 higher than at this station. At the Royal Observatory, the mean temperature of the past year was 46°.9, or exactly one degree lower than that of this district. In the *Philosophical Transactions*, Mr. Glaisher has published the average temperature at Greenwich for a period of 78 years, *i.e.* 48°.3. This is 0°.4 higher than at this hospital. In the same paper Mr. Glaisher gives the average temperature at the apartments of the Royal Society, Somerset House, as being 49°.5. This latter may be presumed to represent the average temperature of London, making a little allowance for its proximity to the Thames, and it thus appears that the temperature, as found at this hospital during the past year, is below the average by 1.6.

Note.—The mean temperature (called also the adopted mean temperature), is thus obtained: the mean temperature from the 9h. a.m., and 3h. p.m. observations of the dry bulb thermometer and the mean from the maximum and minimum thermometers (both previously corrected) are added together and the sum divided by two.

The extreme range of temperature for the year was 69°.6.

The mean daily range of temperature 13°.9.

The highest reading of the thermometer in the shade was 86°.0, and occurred on the 6th of June.

The lowest temperature by night in the air was 16°.4, and occurred on the 19th of February.

The highest temperature in the rays of the sun was 99°.3, and occurred on the 28th of August.

The lowest temperature on the surface of the ground was 11°.5, and occurred on the 19th of February.

The warmest month of the year was July, the mean temperature being 63°.3. The coldest, February, *i.e.* 30°.6.

* *Annual Range.*

HYGROMETRICAL RESULTS.

(Deduced from the mean temperature of air and evaporation, by means of Glaisher's Hygrometrical Tables.

	The Temp. of the Dew Point.	The elastic force of Vapour.	Weight of vapour in a cubic foot of air.	Additional wt. required to sat. a cubic foot of air.	The degree of Humidity (complete sat. =1).	The average weight of a cubic foot of air.
	°	in.	grs.	grs.		grs.
January	33.2	0.208	2.46	0.22	0.920	557.7
February	26.7	0.166	1.96	0.30	0.871	556.8
March	33.5	0.211	2.47	0.47	0.843	546.3
April	43.2	0.296	3.41	0.39	0.900	544.4
May	43.2	0.296	3.40	0.77	0.815	536.1
June	48.7	0.357	4.03	1.34	0.750	530.8
July	56.2	0.461	5.14	1.37	0.789	521.9
August	53.7	0.423	4.73	1.72	0.733	524.4
September	52.6	0.408	4.60	0.99	0.824	531.2
October	47.9	0.347	3.97	0.64	0.862	529.8
November	39.2	0.258	3.00	0.33	0.901	547.9
December	33.2	0.209	2.45	0.41	0.857	550.0
1855.	42.6	0.303	3.47	0.75	0.839	539.8

The difference between the dew-point temperature (42°.6) and the temperature of the air (47°.9) is 5°.3. This difference (the dryness of the air) was greatest during the month of August (9°.3) and least during January (2°.5).

It will be observed that the temperature of the dew-point was the same in January and December; very nearly alike also are some other elements in these two months, but there is a difference in the degree of humidity, referable to a difference of temperature in the two months.

The air was most nearly saturated with moisture during January—least so in August.

A remarkable increase of temperature occurred on the morning of the 22nd of December, the thermometer rising from 19°.8 to 45°.0 in the course of six or seven hours.

WIND.

The wind has blown nearly equally from the principal parts of the compass, the excess being westerly, from which direction the wind came on 184 days.

CLOUDS.

The observations of the kind and extent of clouds are imperfect, in consequence of the circumscribed view of the observer. Clouds, however, are an important element of meteorology. Besides the features more peculiar to themselves, they demand our attention in regard to their modifying influence upon the sun's rays. "It is a subject," says M. Arago,* "which is certainly well deserving of the attention of meteorologists, and will afford to those who will not hesitate to bestow assiduous observation on things so variable, changing, and inconstant as the clouds, a valuable harvest of facts useful to science."

FOG.

The days on which fog has been entirely absent are few in number. November preserved its character in this respect; on the 15th, 16th, and 18th, it was very dense. There was dense fog also on the 10th of January, and on the 4th and 26th of February.

RAIN.

Rain fell to the extent of 20.83 inches. The largest amount fell during the month of July (5.30 inches),—rather more than a fourth of the whole. The smallest quantity was during April (0.26 inches). Rain fell on 128 days, or a little more frequently than on every third day. *Venit, post plurias una serena dies.*

* *Meteorological Essays.*

SNOW.

Snow fell on 16 days, chiefly in January and February. Much of the snow was remarkable for the beauty of its crystalline forms. Under the microscope, and occasionally by means of an ordinary lens, the crystals were seen to be elementary six-sided prisms, belonging to the Rhombohedral system. They are usually composed of six radii, proceeding from a common centre at an angle of 60 degrees, these again being most variably intersected, but always in conformity with the system to which they belong. The representations of the crystals of snow, as published by James Glaisher, Esq., in the *Report of the Council of the British Meteorological Society*, 1855, and elsewhere, are, apart from their scientific relations, most beautiful objects. In that report, Mr. Glaisher has represented 151 crystals, the most remarkable of which fell on Feb. 8th—a day which will not soon be forgotten by all observers of the weather. Mr. Glaisher observes—"When I went out at long past midnight the snow sparkled in all directions with crystals, as granite does with the grains of mica. Every leaf, cobweb, knotty projection, and sheltered nook bore its burden of drifted snow and glistening crystals; it was a night on which to admire the broader effects of Nature as arrayed in all the majesty of her wintry garb. I shall long recal the peculiar stillness of the night air, and the tranquil scene following upon the tumultuous weather of the day, presented by the pale landscape, as the whitened branches of the trees, motionless and bare, appeared to penetrate rather than to fade into the obscurity; whilst not a breath of air disturbed a grain of the heavy masses upon the ground and all around. It was a sight rarely to be observed in these latitudes."—Page 20. Still more remarkable are the snow crystals of the arctic regions, represented in Sir E. Belcher's work, *The Last of the Arctic Voyages.* To the kindness of Mr. Glaisher I am indebted for the information that the forms of these crystals have been noticed by J. Spencer, Esq., to be closely simulated by those of camphor, when made to crystallize from a spirituous solution, on a slip of glass placed under the microscope. The snow is collected in the rain gauge, melted, and registered as "melted snow;" one inch of which is usually regarded as being equal to 10 inches of snow.*

HAIL.

Hail fell on the 11th of May. Sleet on several occasions.

THUNDER AND LIGHTNING.

These are recorded on eight occasions, namely, May 11th, both; July 9th, both; July 11th, lightning only; July 14th and 19th, both; August 24th, lightning chiefly; September 28th, both; October 4th, thunder only. Of these the most remarkable was the lightning of the 24th of August, which continued from about 11h.30 p.m. (23rd) till 2h.30 a.m. (24th). The flashes were frequent and of the most brilliant description, with occasional but not very loud thunder. The colour of the flashes varied from white to purple; being at times blue, pink, yellow, and greenish-yellow. Besides the flashes (sheet-lightning) there were frequent string-like currents—very beautiful, and of most varied and contortuous forms.

ELECTRICITY OF THE AIR.

This important element has been the subject of observation during the past year. A difficulty has always been felt in any attempt of this kind, where the observer's time was limited, or the apparatus at all complicated and liable to get out of order. The instrument employed at this observatory is the common gold-leaf electrometer, with the addition of a brass conducting-rod, to the end of which, when the observation is taken, is attached a lighted fusee, for the purpose of warming the air. (This instrument was first brought into systematic use during the cholera season of 1854, under the direction of James Glaisher, Esq.) The extent and force with which the leaves diverge are taken as a measure of the air's electricity. The *kind* of electricity is ascertained by means of a glass rod or a stick of sealing-wax. As far as the limited observations made at this hospital will permit us to judge, *positive* electricity is found to prevail.

The following is the result of the year's observations :—January, no obs.; February, 18 days, positive; March, 14 pos., 4 neg.; April, 8 pos., 1 neg.; May, 1 neg.; June, 2 pos., 2 neg.; July, 2 pos.; August, 1 pos.; September, 18 pos.; October, 19 pos., 1 neg.; November, 24 pos., 1 neg.; December, 18 pos.

---

* Drew. *Practical Meteorology.*

The electricity of the air is an element of the utmost importance, and is, moreover, as far as we at present know, intimately associated with, and, it may be, the exciting cause of ozone.

OZONE.

This interesting and comparatively new element of meteorology, concerning the nature of which there has been so much discussion, was discovered by Professor Schönbein, by whom attention was first drawn to it in Poggendorff's *Annalen* for 1847.* Whatever be its nature, its presence, it may be assumed, serves to oxidize, and thus to correct the noxious emanations contained in the atmosphere.

Dr. Moffatt says † "the absence of ozone in low lying localities, where cholera has been the most prevalent and fatal, tends to prove that ozone is a purifying agent." During the prevalence of cholera in the preceding year (1854), ozone was found deficient at most observatories. The records of this, however, show that at that period *more* ozone was observed than during the same months of 1855. In the report before quoted, Mr. Glaisher writes:—"Ozone papers were freely distributed in the cholera wards of St. Mary's Hospital; a trace only of discoloration was observed on September 17, 18, and 27, rather more on September 21, 22, and 30, but no trace was noticed at any other time." And again:—"With the exception of the few cases noted at St. Mary's Hospital, every test-paper has remained colourless which has been placed in stagnant air, whether enclosed or not."

It is more distinctly evident in the open country than in towns, the smoke and other matters hanging over which would seem to neutralize it. At this locality, when the wind has had an easterly direction, no ozone has been observed. On the other hand, when the wind has come to us from the W., N.W., S., or S.W., it has frequently, but not invariably, been observed. The test employed depends upon the power of ozone of decomposing iodide of potassium. Paper saturated with a solution of this substance, either alone or combined with starch, is used—the former being Dr. Moffatt's, the latter Dr. Schönbein's test. The following are the results of the year's observations:—January, no obs.; February, none; March, 3 days; April, 5 days; May, 13 days; June, 11 days; July, 3 days; August, 8 days; September, 1 day; October, 5 days; November, none; December, none.

MANUFACTURE OF YELLOW PRUSSIATE OF POTASH, RED PRUSSIATE OF POTASH, PRUSSIAN BLUE, CYANIDE OF POTASSIUM, &c.

(*Continued from page* 283.)

Prussic or Hydrocyanic Acid.—Mohr has shown, that on distilling one part of ferrocyanide of potassium, half-part of sulphuric acid, and the proper quantity of water to dryness, 57.59 per cent. of hydrocyanic acid are obtained, which corresponds to the cyanogen of the cyanide of potassium. On distilling in a current of water-vapour, 86.49 per cent. passed over. Nearly the same amount (85.6), on twice distilling three parts of salt and two parts of sulphuric acid. If the distillation were repeated four times, the quantity of hydrocyanic acid obtained was more than corresponded to the cyanide of potassium. The residuary sediment amounted to only 21.16 per cent. of the salt employed, and the filtrate contained a salt of sesquioxide of iron. Hence it is impossible to state how much per cent. of the cyanogen in ferrocyanogen is obtained in the form of hydrocyanic acid, inasmuch as it depends altogether on the mode of distilling. Medicinal hydrocyanic acid should be prepared with the aid of an analytical experiment.

Wöhler's method of obtaining hydrocyanic acid is by distilling two parts of cyanide of potassium (obtained by fusing eight parts of dry yellow prussiate of potash, three parts of charred cream of tartar, and one part of charcoal), dissolved in six parts of water, with one part of sulphuric acid, previously diluted with one part of water, and desiccating the prussic acid disengaged by means of cyanide of potassium and chloride of calcium, contained in a U-shaped tube. Some of the objections to this method, mentioned by L. Gmelin (namely, the clogging up of the tube, in consequence of the above salts dissolving in the water, distilling over), may,

---

* Vide vol. xiv., p. 216 of this Journal.

† Mr. Glaisher's Report of the Meteorology of London made to the General Board of Health.

according to Wöhler, be readily avoided by placing the neck of the retort upwards, at an angle of about 45°, and by putting between the retort and the U tube a vessel containing some chloride of calcium and cyanide of potassium. The chloride of calcium tube and the intervening vessel are put from the commencement into water at 30°. The hydrocyanic acid gas is condensed in a high and narrow receiver, which, on account of the crystallizing of the acid, is lowered from time to time and surrounded with a mixture of common salt and ice. According to Wöhler, anhydrous prussic acid is most cheaply prepared directly from yellow prussiate of potash, by distilling ten parts of this salt with seven parts of sulphuric acid and fourteen parts of water, in the same manner as stated above, when cyanide of potassium is used. The mixture boils uniformly, and without "bumping," over an open charcoal fire.

Gmelin states that the following mode of conducting the process may be depended upon for giving satisfactory results :—Ten parts of coarsely pounded ferrocyanide of potassium are introduced into a flask, together with a cooled mixture of six parts of sulphuric acid and between thirty and forty parts of water, and a few clippings of platinum. A bent tube is fitted into the flask—its shorter arm, which is not quite upright, being blown out to a bulb in the middle, so as to prevent any contamination of the distillate, by matter spirting up from the flask ; and its longer arm, which is three feet long, and descends gradually, being covered with a long narrow strip of paper, kept constantly wet by means of a dropping bottle. The end of the long arm is fitted by means of a cork into the neck of a tubulated receiver, which, if very strong hydrocyanic acid is to be obtained, must be empty and surrounded with ice ; but, in the contrary case, must contain water, and be surrounded with ice or cold water. In either case a Welter's safety-tube is fitted into the tubulus of the receiver, to convey the escaping air into a long-necked flask containing water, which retains the rest of the hydrocyanic acid. The distillation is continued till the residue is reduced to one-fourth of the original quantity, and in this manner the acid is obtained with scarcely any loss, even in summer.

The following is the process adopted at Apothecaries' Hall, Dublin (Kane) :—1lb. of crystallized prussiate of potash, in fine powder, is placed in a capacious retort, and 2lbs. of water poured on it. To this is added a mixture of 12ozs. of oil of vitriol and 2lbs. of water, previously suffered to cool. These materials are well agitated and allowed to digest from three to four hours, and then between 2 and 3lbs. of dilute acid are distilled over into a receiver containing already 1lb. of distilled water. There are thus obtained 3 or 4lbs. of an acid, containing from 6 to 8 per cent. of real acid. 200 grains of this are weighed and decomposed by an excess of nitrate of silver. The cyanide of silver precipitated is carefully collected, washed, and dried. Being then weighed, the exact per-centage of acid present is found by calculation, and the necessary quantity of water is added, so as to bring it to the standard strength of the Dublin Pharmacopœia—which is that of 1.6 per cent. of real acid, and sp. gr. 0.998. As an example of this process, let us suppose that the 200 grains of distilled acid gave with nitrate of silver 74 grs. of cyanide. As this contains 14.95 of cyanogen, the 200 grains contained 15.53 of real acid, or 7.76 per cent. Now, to reduce this to the Dublin standard, divide 7.76 by 1.6, which gives 485 ; indicating that, by adding 3.85lbs. of distilled water to each pound of acid, the mixture will have accurately the strength directed by the Pharmacopœia. Some of this calculation may be spared by considering the cyanide of silver to be equivalent to one-fifth of its weight of real prussic acid. The quantity per cent. in the supposed example should be one-tenth of the weight of the cyanide of silver obtained from the 200 grains—that is, 7.4 per cent.; and the water necessary to bring it to the Dublin standard should be 3.63 times its weight. The error introduced by this supposition is not sensible, being but 0.002 per cent.

Mr. Laming's process for making hydrocyanic acid at a cost low enough to admit of its application to the economical production of the cyanurets, ferrocyanurets and hydrocyanates generally, is as follows:—A cylindrical retort of cast iron, eight feet long, and eighteen inches internal diameter, lined with fire-tiles fitted to its shape, and set vertically in a furnace, is filled with pieces of charcoal, and brought to a red heat. Ammonia, more or less pure, in the form of gas, or even combined in a state of vapour with certain other substances, which do not prevent the desired result, is introduced by a pipe near one end of the heated retort. In its passage, the ammonia is deprived of its constituent hydrogen, while the remaining part, together with its

nitrogen, combine with carbon to form prussic or hydrocyanic acid, which finally escapes from the heated retort in the form of vapour, accompanied by other elastic matters, among which will be, if the admission of the ammonia into the retort has been too rapid, some of that substance in an undecomposed state. The prussic acid and vapour thus obtained may be condensed in water, or by other convenient means, for subsequently making the compounds of cyanogen or other purposes; or it may be brought at once into communication with the several substances with which it or its constituent cyanogen is to be combined. Thus, for example, it may be received into caustic solutions of the fixed alkalies, and with them made to dissolve iron, giving rise in the first instance to solutions of hydrocyanates of potash and of soda, and afterwards to solutions of the ferrocyanure of potassium and sodium; or it may be received into water containing certain metallic cyanurets or hydrocyanates.

Extemporaneous Hydrocyanic Acid.—To a solution of nine parts of tartaric acid in sixty parts of water, contained in a well-stoppered bottle nearly filled with it, four parts of pure cyanide of potassium are added; the vessel shaken, frequently dipped into cold water, and then left in the cold for twelve hours, and the aqueous hydrocyanic acid, which contains but a very small quantity of tartrate of potash, poured off from the crystallized tartrate.

Manufacture of Prussian Blue.—The old mode of making Prussian Blue, in a proper state for the market, was by precipitating a solution of common copperas in proto-sulphate of iron, by a mixed solution of the carbonate and ferrocyanate of potash, and allowing the mixed precipitate of oxide and prussiate of iron, to remain for three weeks in contact with the air, when it was, in technical language, "brightened" by the addition of a dilute acid, generally hydrochloric. The theory of this process appears to have been this—in the first place, protocyanide and protocarbonate of iron were precipitated together, and then, by exposure to the air, passed into the state of peroxide of iron and Prussian blue, the peroxide of iron meanwhile acting mechanically and preventing the particles of Prussian blue from cohering together and becoming one hard mass, as invariably happens when no such impediment to cohesion is present. Having obtained this end, the dilute hydrochloric acid was employed to dissolve away the superfluous oxide of iron, and thus bring out the brilliancy of the blue colour, whilst it increased the peculiar spongy and friable nature of the product, and this, after copious washings of hot water was next dried ready for sale. The practice of the present day is, however, much simpler and speedier than this; for instead of three weeks, scarcely three days are now necessary for the production of Prussian blue. The plan generally followed is, to dissolve in two separate portions of boiling water exactly as much proto-sulphate of iron and prussiate of potash as will mutually decompose each other; these solutions are then mixed and boiled rapidly with peroxide of iron; the whole is then allowed to cool, and is then brightened by a dilute acid, copiously washed with warm water, dried, and rendered fit for the market. Previous to drying, the colour is very often brought down by the addition of inert colourless substances, such as starch, finely ground rice, china clay, or alumina, according to the object of the manufacturer.

Manufacture of Prussian Blue by means of the Nitrogen of the atmosphere.—The following method is that indicated by Lewis Thompson. Take of pearlash or potash two parts, coke cinders or coal two parts, iron-turnings one part; grind the whole together into a coarse powder, and place it in an open crucible or other convenient vessel, and expose the whole for half an hour in an open fire to a full red heat, stirring the mass occasionally. During the process, little jets of purple flame will be observed to arise from the surface of the mixture; when these have almost ceased to appear, which will happen in about the time specified, the whole must be removed from the fire and be allowed to cool. Water is now to be added, so as to dissolve the matter soluble in that fluid, and the black matter remaining put aside for another operation —the solution after being filtered, is to be mixed with one part of copperas and muriatic acid added, in the usual way, to heighten the colour of the precipitate. The quantity of Prussian blue produced from a given weight of pearlash or potash is generally about one-fourth of the weight of the pure potash contained in the salt; but the larger the quantity operated upon at one time, the larger is the relative produce. Thus six ounces of pearlash, containing forty-five per cent. of alkali, yielded only 2.95 grains of Prussian blue, whilst one pound of the same pearlash yielded 1.356 grains. In this process the potash is decomposed by the iron, producing potassium, which, being volatile, rises and combines with the carbon of the coke, and with the

nitrogen of the atmosphere, the oxygen of which has been removed by passing through the fire, or by the coke or cinders. The cyanide of potassium thus formed is next dissolved in water, and furnishes ferrocyanide of iron with addition of sulphate of iron and muriatic acid in the usual way. By deflagrating a mixture of nitrate of potash, coke or small coals, and iron-turnings, a mass is obtained which furnishes abundance of Prussian blue; but in this case the nitrogen is derived from the decomposition of the nitrate of potash, for the experiment succeeds equally well in a closed vessel. In these experiments soda may be substituted for potash without affecting the result; the charcoal from several kinds of vegetables cannot, however, be employed in place of that from coal, as it is very porous and burns away too quickly. The presence of ferrocyanide of soda in barilla kelp and English alkali, is thus easily accounted for, and the small quantity of cyanide of potassium usually produced during the process of preparing potassium, admits of a similar explanation.

Read's Patent Soluble Prussian Blue.—Cyaniodide of iron or soluble Prussian blue is obtained by adding iodide of iron, with iodine in excess, to yellow prussiate of potash, the quantities being in proportion to the equivalents of the final products. Prussian blue remains on the filter, and is perfectly soluble when washed and dried, and pure iodide of potassium, as a residuary product, is obtained by evaporating the colourless filtered liquor, fusing and crystallizing.

Equivalents of Cyaniodide of Iron:

Iron	7	196	30.8
Cyanogen	9	234	36.8
Potassium	2	80	12.6
Iodine	1	126	19.8
Cyaniodide of Iron	7	936	100.0

In the above process water is not decomposed, and there is no formation of hydriodic acid; but iodine appears to play the part of oxygen, and imparts to the Prussian blue the same rich tone that is obtained from a per-salt of iron. Without excess of iodine, the precipitate is nearly white, but rapidly absorbs oxygen from the atmosphere, and is soluble.

(*To be continued.*)

REDUCTION OF THE METALS BY HYDROGEN.

St. Claire Deville states that the reduction of volatile metals depends very much upon the rapidity of the current of reducing gas. Thus, for instance, when oxide of zinc is ignited in a rapid current of hydrogen, the metal is reduced, while by ignition in a slow current of the same gas no metallic zinc is obtained, there is formed, at another part of the tube, crystallized oxide of zinc.

He considers that, in the latter case, reduction does take place, but that, owing to the slowness of the current of gas, the water vapour formed is not removed soon enough to prevent a further reaction between it and the vapour of zinc, reproducing oxide of zinc. In this way he accounts for the transfer of the oxide of zinc from one part of the tube to another, and is of opinion that the apparent volatilization of oxide of zinc in this experiment and in metallurgical operations, is owing to this reaction which takes place at a lower temperature than the reduction of the oxide of hydrogen.—*Ann. de Chim. et de Phys.*, xliii. 47.

BED OF NITRATE OF POTASH IN PENNSYLVANIA.

Professor Ellet reports that a remarkable bed of nitrate of potash was recently discovered in Bradford. It occurs in the horizontal fissures of a sandy rock, and in the fissures which run from it in various directions. The rock itself, which is very porous, is likewise highly impregnated with the salt. The rock is siliceous, and contains some carbonate of lime, together with a sensible quantity of silicate of potash. The nitrate is very pure, containing but mere traces of nitrates of lime and magnesia.—*Journ. de Pharm. et de Chim.*, xxvii. 295.

CHEMICAL HISTORY OF THE FATS.

BY W. HEINTZ.

Chevreul's* investigations showed that the fats consist of substances analogous in their constitution to the compound ethers, and decomposable by alkalies into acids, which combine with the alkali and an indifferent substance, which may be either soluble in water, as glycerine is, or insoluble, like ethal. The fat acids, whose alkali salts are thus formed, are, according to Chevreul, generally stearic, margaric, and oleic acids; and it is only in a few instances that they are accompanied by other acids—as for instance, butyric acid, caproic, capric, and caprylic acids in butter; in the oil of *delphinus globiceps*, phocenic acid; and in goat's fat, hircic acid.

The investigations subsequently made by Redtenbacher, Bromeis, Varrentrapp, &c., may be regarded as continuations of those of Chevreul, and their object was to ascertain the relations which the fat acids bore to each other in constitution; and their results would appear to show that stearic acid, which melts at 70° C. (158° F.), is a lower oxide than margaric acid, which melts at 60° C. (140° F.). The former was regarded as consisting of $C_{68}\ H_{66}\ O_5 + 2\,HO$, the latter as consisting of $C_{34}\ H_{33}\ O_3 + HO$. This view was supported by experiments, which appeared to prove the conversion of the one acid into the other, under the influence of oxidizing substances.

Afterwards a variety of fats were examined chemically; and as it was held that the fat acids obtained by saponification, were chemically pure substances when they had been crystallized from solution in alcohol, until the melting point was no longer altered; it was supposed, when these acids presented characters different from those of the acids already known, that this was sufficient reason for regarding them as substantially different, and for applying to them new names. In this way a great number of names have been applied to substances, which were regarded as individual fat acids.†

Heintz's investigations of the fat acids have led him to call in question the chemical individuality of many of these substances. The single observation, that some mixtures of different fat acids separate from solution in alcohol with the same characters—for instance, the same melting point—as the mixture had before solution, is in itself sufficient to raise a doubt on this point.

He has therefore attempted to determine with certainty the chemical individuality of a fat acid, by means of the method of partial precipitation, in the following manner:—

At least one gramme of the substance, whose melting point has been observed, is dissolved in so much alcohol, that on cooling the liquid to the ordinary temperature, there would not be any separation of the dissolved substance; then, while the liquid is hot, it is mixed with a solution either of acetate of magnesia in alcohol, or of acetate of baryta in very little water, in quantity insufficient to precipitate the whole of the fat acid.

When the fat acid to be examined has a melting point above 53° C. (127°.4), the magnesia salt is preferable; in other cases the baryta salt is used as the precipitant. Of the latter about $\frac{2}{7}$, and of the former about $\frac{1}{4}$ or $\frac{1}{5}$ the weight of the fat acid is requisite.

After the mixture has become cold, and the baryta or magnesia salt has separated, it is collected by filtration, washed with alcohol, pressed, and covered with very dilute hydrochloric acid, which is boiled until the oily stratum floating on the surface is perfectly clear. The fat acid thus obtained is then examined as to its melting point.

The residual fat acid in the alcoholic liquid must also be separated. But this must not be done by the addition of a strong acid, because that might cause the formation of some ether of the fat acid, and thus considerably reduce the melting point. It is best therefore to neutralize the alcoholic solution with carbonate of soda, adding afterwards some caustic soda or potash, and boiling the liquid until it no longer smells of alcohol. The remaining solution is then decomposed by dilute hydrochloric acid, the fat acid separated, and its melting point observed.

When both portions of acid have the same melting point, as the fat acid presented before the partial precipitation, the chemical individuality of the substance may be regarded as certain.

---

* Chevreul, *Recherches Chimiques sur les Corps Gras d'origine Animal.* Paris, 1823.

† *Journ. für prakt. Chimie.* October, 1855.

Heintz has applied this method in a somewhat altered form to effect the examination of mixtures of fat acids.

The fat to be examined is first saponified in the ordinary way, the fat acids separated by boiling with hydrochloric acid, then mixed with a little hot alcohol and pressed forcibly—the same operation being repeated several times with the dry cake. When the liquid portion of the fat acid has been completely separated by this means, the expressed liquid is mixed with acetate of lead and some ammonia, the precipitated lead salt washed with water, dried, and the oleate of lead separated by treatment with ether. The undissolved portion is freed from ether by evaporation, mixed with water, and boiled with very dilute hydrochloric acid until the oily stratum is quite clear. This fat acid, mixed with the solid pressed portion, is dissolved in alcohol, crystallized and pressed, until the melting point is no longer affected by this treatment.

In order to test the chemical individuality of this product, it is then subjected to partial precipitation as already described. If it proves not to be a mixture, there remains only the alcoholic solution to examine. In the other case, the crystallization from a proportionately large quantity of alcohol is continued, and in this way it is often possible to obtain a sufficient quantity of fat acid to repeat the test of partial precipitation.

The whole of the alcoholic solutions obtained in this operation are mixed, while hot, with an alcoholic solution containing about $\frac{1}{30}$ or $\frac{1}{40}$ as much acetate of magnesia as there is fat acid in solution. When the mixture is cold, the precipitate is collected upon a filter washed with a little alcohol, pressed dry, and decomposed by boiling with very dilute hydrochloric acid. The filtrate is neutralized with ammonia, successively mixed with fresh quantities of the magnesia salt, the precipitates separated and decomposed in the same manner, and the several portions of fat acid numbered in order. When acetate of magnesia no longer produces a precipitate, acetate of baryta, amounting to $\frac{1}{20}$ of the original quantity of fat acid dissolved by the alcohol, and dissolved in the least quantity of water, is added in successive portions, and any precipitate that may be formed collected apart, and the fat acid separated from them in the same way as from the magnesian precipitates. Lastly, when no further precipitate is produced by acetate of magnesia, the alcohol is distilled off, the residue acted upon by dilute hydrochloric acid, the acid thus separated boiled with an alcoholic solution of potash in order to decompose any ether that might have been formed, and after adding water and evaporating the alcohol, the potash soap is decomposed by hydrochloric acid.

These several portions of fat acid, from eight to twelve in number, are then recrystallized from alcohol until their melting points are no longer raised. Sometimes the melting point is lowered by this treatment, at least in the first instance. In this case, there is a tolerable certainty that a pure substance cannot be obtained in this way. Generally, however, the melting point of most of these portions of fat acid is considerably raised by re-crystallization from alcohol, and eventually pure substances may be obtained, either in this way or by means of partial precipitation.

If this should not prove to be the case, this method of examination affords indications which, if they do not at once make known the composition of the fat acid under examination, at least furnish a clue to it. These indications consist in the peculiar behaviour of mixtures of fat acids in regard to their melting point.

Gottlieb observed that when the fat acid melting at 60° C. (140° F.), to which the name of margaric was applied, is mixed with a little stearic acid, whose melting point is 70° C. (158° F.), the melting point of the mixture is much below 60° C., and that by increasing the proportion of stearic acid, it is reduced to a minimum, and then rises gradually. He also observed that the mixtures solidified in a manner quite different from the pure acid.

This observation of Gottlieb has been considerably extended by Heintz. In the first place, he showed that the fat acid called margaric acid, which melts at 60° C., and in solidifying crystallizes at the surface in needles, is a mixture of two acids, whose melting points are respectively higher than that of the mixture,—viz., stearic acid, whose melting point is 69°.2 C. (124°.5 F.), and palmitic acid, whose melting point is 62° C. (143°.6 F.) This was proved, on the one hand, by the fact that a mixture of about nine parts palmitic acid with one part stearic acid has all the characteristics of the fat acid called margaric acid, and, on the other hand, by the actual separation of this substance, prepared by Bromeis, into pure stearic and palmitic acids.

The mixture of stearic and palmitic acids that was supposed to be margaric acid, has a far greater capability of crystallization than either of those acids in the pure state, and, when solidifying, forms long needles at the surface, while the pure acids present at the surface irregular projections, upon which only small bright spots can be perceived by reflected light.

Heintz ascribes this greater capability of crystallizing to the circumstance that at a temperature of 60° C. palmitic acid crystallizes out from the mixture of fat acids, while the mixture which melts at a lower temperature, serves as a menstruum and remains liquid at 54° C.

This would naturally lead to the conjecture that when stearic acid preponderates in the mixture to a certain extent, there would be a more perfect crystallization. In the examination of human fat Heintz obtained a fat acid, which solidified at the surface in broad lamelar crystals, and which he regarded as a distinct acid, giving it the name of anthropic acid. But this substance, melting at 56° C. (132°.8 F.), proved to be nothing more than a mixture of palmitic and stearic acids, from which stearic acid crystallizes, while a portion remains liquid at this temperature.

Therefore, when stearic acid is mixed with larger proportions of palmitic acid, the melting point is lowered even below that of palmitic acid. The fat acid is at first rendered proportionately less crystalline, but the mixture which has a melting point of 56° or 57° C., crystallizes in laminæ. By increasing the proportion of palmitic acid, the melting point is further reduced until it reaches 55° C. Further increase of the proportion of palmitic acid raises the melting point, though without the crystallizibility of the mixture becoming greater until the melting point reaches 58° C.; and from mixtures melting between this point and 60° C., palmitic acid crystallizes out in needles most perfectly. Further increase in the proportion of palmitic acid then renders the crystallization less marked, until finally the mixture solidifies like pure palmitic acid.

The influence of the proportion of stearic and palmitic acids upon the melting point of mixtures may be represented by a curve commencing with the melting point of palmitic acid.

This law, which was established first for mixtures of stearic with palmitic acids, likewise obtains for mixtures of palmitic with myristic acids, and of myristic with laurostearic acids. The melting points of analogous mixtures are lower the lower the melting points of the acids constituting the mixture. A mixture of any two of these acids in certain proportions, forms, in solidifying, a crystalline mass of needles, and in other proportions a lamelar mass; the former resembling the substance called margaric acid, the latter resembling that to which Heintz applied the name of anthropic acid. The proportion of acids, with higher and lower melting points, in margaric acid, and the mixtures which solidify like it, is uniformly 1 : 9. This is also the case with anthropic acid and the mixtures solidifying like it, the proportion by weight being 4 : 5.

Hence it is evident that when mixtures of fat acids have been so far separated, by means of partial precipitation and repeated crystallization, from alcohol, that there is reason to believe there are only two of these more important solid fat acids in the mixture, the observation of the melting point and of the mode of solidification, as well as the changes that these characters may undergo by further re-crystallization, will enable the experimenter to judge with a tolerable degree of certainty of the nature of the acids constituting the mixture. This certainly presupposes that there are no other than these four acids in the mixture; but, besides them, there is no known fat acid whose melting point is within the limits laid down—69°.2 and 35°.1 (156°.5 and 95°.2 F.), and which has been shown to possess chemical individuality. So that, although it must be admitted these facts are not alone sufficient to determine with certainty the composition of a mixture of fat acids, still they furnish very important data, which, together with others obtained in the examination, will afford the requisite amount of evidence.

The accompanying table, in which the substances are arranged according to their melting points, shows the composition of various mixtures of these four acids. By means of it the mixtures which have any particular melting point may be readily referred to, and as the character of the solidification of mixtures with similar melting points is also given, it is easy to find what is probably the composition of a mixture of fat acids obtained in the examination of a fat.

MELTING POINT.		COMPOSITION OF MIXTURE.					CHARACTER OF SOLIDIFICATION
Cent.	Fahr.	Parts.			Parts.		
69°.2	156°.6		Stearic acid (pure)				Flaky crystalline
67°.2	152°.9	90	Stearic acid	and	10	palmitic acid	" "
67°.1	152°.8	90	"	"	10	myristic acid	" "
67°.0	152°.6	90	"	"	10	lauric acid ...	" "
65°.3	169°.6	80	"	"	20	palmitic acid	Fine crystalline needles
65°.0	149°.0	80	"	"	20	myristic acid	Flaky crystalline
64°.7	148°.5	80	"	"	20	lauric acid ...	" "
62°.9	145°.2	70	"	"	30	palmitic acid	Fine crystalline needles
62°.8	145°.0	70	"	"	30	myristic acid	Distinctly flaky crystalline
62°.0	143°.6	70	"	"	30	lauric acid ...	Indistinctly flaky
62°.0	143°.6		Palmitic acid (pure)				Flaky crystalline
60°.3	140°.5	60	Stearic acid	and	40	myristic acid	Uncrystalline
60°.1	140°.2	90	Palmitic acid	"	10	stearic acid...	Large acicular crystals
60°.1	140°.2	90	"	"	10	myristic acid	Flaky crystalline
59°.8	139°.6	60	Stearic acid	"	40	"	Somewhat flaky
59°.8	139°.6	90	Palmitic acid	"	10	lauric acid ...	Distinctly flaky
59°.0	138°.2	60	Stearic acid	"	40	" ...	Granular crystalline
59°.0	138°.2	80	Palmitic acid	"	20	myristic acid	Transition from the flaky to the acicular crystallization
57°.5	135°.5	20	Stearic acid	"	80	palmitic acid	Indistinctly acicular
57°.4	135°.3	80	Palmitic acid	"	20	lauric acid ...	Slightly flaky
56°.6	133°.9	50	Stearic acid	"	50	palmitic acid	Large lamellar crystals
56°.3	133°.3	40	"	"	60	"	" " "
55°.8	132°.4	50	"	"	50	lauric acid ...	Almost uncrystalline, and slightly granular
55°.6	132°.1	35	"	"	65	palmitic acid	Uncrystalline
55°.2	131°.4	32.5	"	"	67.5	"	"
55°.1	133°.2	30	"	"	70	"	"
54°.9	130°.8	70	Palmitic acid	"	30	myristic acid	Very minute needles
54°.5	130°.1	50	Stearic acid	"	50	"	Uncrystalline opaque
54°.5	130°.1	70	Palmitic acid	"	30	lauric acid ...	Somewhat distinctly flaky
53°.8	128°.8		Myristic acid (pure)				Flaky crystalline
51°.8	125°.2	10	Palmitic acid	and	90	myristic acid	Crystallizes in long needles
51°.8	125°.2	90	Myristic acid	"	10	lauric acid ...	Flaky
51°.7	125°.1	10	Stearic acid	"	90	myristic acid	Uncrystalline opaque
51°.5	124°.7	60	Palmitic acid	"	40	"	Uncrystalline
51°.2	124°.2	60	"	"	40	lauric acid ...	Granular, indistinctly flaky
50°.8	123°.4	40	Stearic acid	"	60	"	Uncrystalline
50°.4	122°.7	40	"	"	60	myristic acid	Fine large lamellar crystals
49°.6	121°.3	80	Myristic acid	"	20	lauric acid ...	Crystalline, but neither flaky nor acicular
49°.5	121°.1	20	Palmitic acid	"	80	myristic acid	Uncrystalline
48°.2	118°.8	30	Stearic acid	"	70	"	Lamellar crystals
47°.8	118°.0	50	Palmitic acid	"	50	"	Large lamellar crystals
47°.8	118°.0	20	Stearic acid	"	80	"	Indistinctly crystalline
47°.0	116°.6	40	Palmitic acid	"	60	"	Indistinctly lamellar
47°.0	116°.6	50	"	"	50	lauric acid ...	Almost wholly uncrystalline
46°.7	116°.1	70	Myristic acid	"	30	"	Crystalline, but neither flaky nor acicular
46°.5	115°.7	35	Palmitic acid	"	65	myristic acid	Uncrystalline opaque
46°.2	115°.2	30	"	"	70	"	" "
43°.6	110°.5		Lauric acid (pure)				Flaky crystalline
43°.4	110°.1	30	Stearic acid	and	70	lauric acid ...	Small brilliant granular crystals
43°.0	109°.4	60	Palmitic acid	"	40	"	Uncrystalline, with some shining points on the surface
41°.5	106°.7	10	Stearic acid	"	90	"	Uncrystalline
41°.5	106°.7	10	Palmitic acid	"	90	"	"
41°.3	106°.3	10	Myristic acid	"	90	"	Acicular crystals
40°.1	104°.2	40	Palmitic acid	"	60	"	Large lamellar crystal
38°.5	101°.3	20	Myristic acid	"	80	"	Uncrystalline
38°.5	101°.3	20	Stearic acid	"	80	"	"
38°.3	100°.9	30	Palmitic acid	"	70	"	Small lamellar crystals
37°.4	99°.3	50	Myristic acid	"	50	"	Large lamellar crystals
37°.1	98°.8	20	Palmitic acid	"	80	"	Indistinctly crystalline
36°.7	98°.2	40	Myristic acid	"	60	"	Uncrystalline, with a few shining points
35°.1	95°.2	30	"	"	70	"	Uncrystalline

(To be continued.)

PREPARATION OF HYDROCYANIC ACID.

Wittstein has examined the reactions that take place in the preparation of hydrocyanic acid from ferrocyanide of potassium and sulphuric acid, and comes to the conclusion that—

1. The first action consists in the formation of sulphate of potash and hydroferrocyanic acid, while one-fourth of the ferrocyanide remains unaltered.

$$4\,(2KCy+FeCy)\ \&\ 6\,(SO_3+HO)=6\,(KO+SO_3)\ 3\,(FeCy+2HCy)\ \&\ 2KCy+FcCy.$$

2. When heat is applied the hydroferrocyanic acid is decomposed into hydrocyanic acid and cyanide of iron, which latter combines with the unaltered ferrocyanide of potassium, forming an insoluble substance, KCy+2FcCy.

$$3\,(FeCy+2HCy \text{ and } 2KCy+FeCy=6\ HCy \text{ and } 2\,(KCy+9\ FeCy).$$

3. The insoluble substance is partially decomposed by access of air; the potassium of the decomposed portion being separated and removed by the water used for washing; while the cyanide of iron is converted, by combination with the cyanogen, into Prussian blue, and by oxidation of a portion of the iron into basic Prussian blue. The amount of Prussian blue in the blue substance is about 10 per cent.—*Vierteljahrschrift für Prakt. Pharmacie*, iv. 515.

COMPOSITION OF THE YELLOW SUBSTANCE OBTAINED IN THE MOLYBDIC ACID TEST FOR PHOSPHORIC ACID.

Nutzinger has analysed this substance, and finds that, when air dried, it consists of—

	I.	II.		Calculated.
Water	1.875			
Ammonium oxide	3.407	3.481	5	3.577
Phosphoric acid	3.738	3.818	2	3.962
Molybdic acid	90.740	92.701	48	92.461
	99.760	100.000		100.000

When heated at 212° it loses water, and has the composition II.

The chemical constitution of this substance is obscure, and will probably be rendered intelligible only by a more intimate knowledge of the compounds of molybdic acid generally.—*Vierteljahrschrift für Prakt. Pharmacie*, iv. 549.

THE KUMIS AND RAKY OF THE TARTARS.

The Calmucks and most of the shepherd tribes of Central Asia prepare from the milk of their cattle two kinds of beverage. The one is called "Kumis," and is sour milk which has undergone a certain degree of vinous fermentation; it corresponds with the "pinna" of the Laplanders, which is made with reindeer milk.

The other beverage is an intoxicating, agreeable-flavoured liquid, obtained from "kumis" by distillation. The Calmucks make the distillation in a vessel of unburnt clay, a piece of reed serving for the delivery tube; the receiver is covered with wet clay so as to condense the vapour. The distillation is sometimes effected with reeds or dried herbs for fuel, but more generally with the dung of cattle, especially the dromedary, previously dried in the sun.

Good "kumis" cannot be obtained from every kind of milk. That made with the milk of cows or of sheep is bad. The milk of camels, and of mares particularly, gives three times as large a product.

The "kumis" is prepared by mixing six parts of warm milk with one of warm water, and some old "kumis" as a ferment; then fermenting with frequent agitation. Artificial temperature and agitation appear essential for the fermentation.

The spirit obtained from "kumis" by distillation is called "rak," or "raky." This word is evidently derived from "arak," which is the name given by the Indians to their spirituous liquors.

The preparation of these beverages is the office of the women.—*Union Médicale, Journ. de Pharm.* xxvii., 196.

REMEDY FOR HYDROPHOBIA.

Dr. de Sandorffy, of the Odenburger Comitats, Hungary, employs as a preventive against hydrophobia in case of the bite of a mad dog, the following measures:

The wound is brought into a state of suppuration by means of an ointment composed of *Ung. basilic. Pulv. cantharid.* and *Pulv. hydrarg. oxyd. rubr.*, and a powder is administered daily—consisting of

Pulv. rad. Valerian, gr. x.
" Cantharidum
" Meloës majalis, gr. $\frac{1}{4}$
Sacchari alb. gr. vi.

Dr. Sandorffy states that during forty-four years he has had 160 cases of bite by mad dogs or cats, and in no instance has this treatment failed in preventing hydrophobia. In 70 out of the 160 cases the madness of the animals was unquestionable. —*Wachtel's Zeitschrift für Natur.*, and *Heilkunde in Ungarn*, 1854, No. 26.

A NEW GUN COTTON.

A correspondent of the American Journal of Pharmacy (Mr. Caldwell) describes a new kind of gun cotton, which is made as follows:—Newly prepared gun cotton is placed in a saturated solution of chlorate of potash, and allowed to remain for fifteen minutes. It is then gently pressed between folds of clean linen rag, and dried over a heat of 150 degrees. The cotton thus prepared, explodes much quicker, and more like fulminating silver, than the ordinary gun cotton. From some experimental shots, the result was as follows. A pistol loaded with nine grains by weight of the ordinary cotton, sent a ball about half through a yellow pine door one inch thick, at the distance of twenty feet. It was then fired with two grains of the cotton treated with chlorate of potash, when the pistol was shattered to pieces. Another pistol was loaded with one grain of the cotton, when the ball passed entirely through the door, making a perfecty smooth perforation.

DEATH BY ESSENTIAL OIL OF ALMONDS.

Considerable sensation has been produced by the death of Mr. John Sadlier, late M.P. for Sligo, whose body was found on Sunday morning, Feb. 17th, on Hampstead Heath. It appears from the evidence given at the inquest, that a silver cream jug, and a bottle (8 oz.) marked " poison " in several places, were found close to the body. A *post mortem* examination of the body was made by Mr. R. Nichol, surgeon, of Hampstead; it bore no mark of external violence; there was an odour of essential oil of almonds all over the body. The stomach contained about ten ounces of matter consisting mostly of undigested food. From six ounces of that matter he took an ounce and a half of essential oil of almonds by distillation, and half an ounce by filtration. Embedded in the coats of the stomach, and lying on it, were numerous black particles, which, on examination with the microscope, he believed to be powdered opium. There could be no doubt that the essential oil of almonds was the cause of death. The inquest was resumed on Monday, Feb. 25, when the correspondence produced disclosed some most remarkable proceedings, which fully account for the embarrassed state of the deceased. The inquest has been further adjourned to the 11th of March, for the purpose of competing the evidence.

INDIGENOUS OPIUM.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—I have for a long time past been gratified and instructed by the perusal of the *Pharmaceutical Journal.* I may truly say that I never take up a number in which I do not find matter of interest. Allow me to make a small return, in evidence of the benefit I have experienced, by the following communication on the subject of the preparation of opium :—

This highly valuable and important substance is brought to these countries in very different conditions of purity and availability. All samples of opium in the gross should, I conceive, be accompanied by an attested statement of the

per-centage of morphia. Medicines pass through so many hands now-a-days that there is nowhere almost any certainty—any responsibility. Drugs derived from the vegetable world are carelessly gathered by the savage in his native wilds, then transferred to the wholesale exporter and importer, then to the wholesale druggist, and finally to the dispensing and prescribing apothecary and physician, by whom they are taken and employed almost wholly on trust; that is to say, in a state of ignorance more or less complete as to the exact condition and relative constitution of the important substances made use of. By means of a little care—a little energy, these drawbacks might be greatly mitigated, and perhaps even wholly got rid of.

What, for example, is to hinder opium from being prepared to any extent in France and England—not by the absurd and precarious method of incising the poppy-capsule—but by saving and drying the whole capsule, of course setting apart the seed? The poppy is one of the most remunerative and certain of crops, and even here produces most luxuriantly. I have often tasted, if I have not further tested, our native poppy-juice, and am of opinion that it is as rich in opium extract as any other.

I would employ indifferently the recent or the dried poppy-capsule in preparing poppy-extract—opium to wit—just as I would prepare any other extract. In the same way morphia might be prepared from the dried or recent plant to any desired extent. We should in any and every case have a cleanly scientific extract, and at a reasonable outlay, instead of the barbarously-prepared masses, composed partly of poppy-extract and largely of the various impurities which it suits the rude ingenuity of the savage gatherers to incorporate with it.

It concerns us all to see to these matters, and to use our utmost ability to obtain abundantly and purely those precious drugs which, sanely and judiciously employed, surely realize the relief of human agony and disease. It is quite monstrous that medicinal substances of any kind, for the purity of which no one is prepared satisfactorily to vouch, should be vended by the druggist, prepared by the apothecary, and prescribed by the physician.

In these matters we all have an equal interest, and should leave no means unused to discharge the common duty, as to learning, as far as may be, the purity and efficiency of the medicaments that we employ, which devolves upon us.

I am, Sir, your obedient servant,

HENRY M'CORMAC, M.D.,

Belfast, Feb. 10th, 1856. *Consulting Physician to the Belfast Hospital, &c.*

THE MEDICINE STAMP.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

SIR,—The operation of the Medicine Stamp Act has been discussed many times, but the mode of carrying it out is very objectionable. I enclose you a "Cough Lozenge" bill of one of my neighbours, who although having been (with myself) once fined for selling articles *liable*, without a stamp, still risks his preparations for the sake of selling them in small quantities, while I, fearful of another information, dare not sell less than a 1*s.* 1½*d.* box—stamped. The consequence is this, customers ask me for an ounce of cough lozenges, and when I say that I cannot sell less than a 1s. box—being compelled by law to stamp them—the reply is, "Why Mr. B—, over the way, sells his at 4*d.* per oz;" and so B. does—not caring for the Stamp Office, because he can afford to pay £20 if caught, whilst I, being poor,* am obliged to observe the law for fear of the consequence.

Now, Sir, the Government ought either to look to this matter closely, or make an exception in all articles sold at or below 6*d.* The latter course is one which I think only just, as the poor would be the only parties benefited thereby, and I cannot see that it would decrease the revenue. I add no names, but enclose my card.

Yours truly, M. P. S.

* Poverty is a blessing if it makes a man honest.—ED.

"ANALYSIS OF BANK-NOTE SLAG."

Dr. Griffin regrets to find that he omitted to mention, in his paper on the above subject (p. 353), the following step in the analysis:—

The main solution, after being reduced by boiling with sulphite of soda, and subsequently with caustic soda, gave a dense black precipitate (*a a*) and a filtrate (*b b*). The former was dissolved in hydrochloric acid, neutralised with ammonia, the metals precipitated by sulphide of ammonium, and the filtrate (containing much of the *lime* thrown down by the caustic soda, being always *carbonated*) added to (*b b*). The sulphides were then dissolved in nitro-hydrochloric acid, &c., &c., &c.

TO CORRESPONDENTS.

R. M. A. (Leeds).—(1.) The letter of our correspondent will be referred to the Pharmacopœia Committee.—(2.) We are not aware that a new edition of Lindley's *Vegetable Kingdom* is contemplated at present.

E. E. (Weymouth).—Oxide of zinc and carbonate of zinc are soluble in the mineral acids, the former without effervescence.

P. S. (London).—The cost of licence for the use of stills is 10*s.* per annum. See vol. vi., page 117.

A. F. Z. (Stow-on-the-Wold).—Binoxalate of potash, or oxalic acid.

N. V. A. (Jersey).—(1.) *Iodide of Calcium*, a solution of lime in aqueous hydriodic acid, evaporated to dryness, and heated out of contact of air. *Gmelin.* —(2.) Apply to Dr. Smith, 6, Whitehall Yard.

T. L. (Derby).—(1.) The price is 28*s.*—(2.) Clater's *Veterinary Practice*, edited by Youatt and Spooner, 6*s.*

T. P. (Pembroke Dock) should apply by letter to the Secretary of the Royal College of Surgeons, Lincoln's Inn Fields.

A Student (Stowmarket).—(1.) Hooper's *Medical Dictionary.*—(2.) Wilson's *Anatomist's Vade-Mecum.*

M. P. S. (Plymouth).—The course of study requisite for passing the examinations of the Pharmaceutical Society is equally applicable to the department of dispensers in the army.

A Druggist's Assistant (Rochester) would not be likely to obtain a situation in Paris, if unable to speak the French language.

A Member (Manchester).—The linseed-meal generally sold is that prepared from the seed after the greater part of the oil has been expressed. The ground seed would be too greasy for most purposes to which linseed meal is applied.

M. P. S. (Ramsgate).—We are unable to give the information.

Army Medical Department.—S. W. (Plymouth).—The office of the Army Medical Department is removed from St. James's Place to 6, Whitehall Yard. Application should be made to Dr. Smith. The permanent appointment of dispensers in the army is not yet decided upon.

Ignoramus (London).—(1.) Metallic arsenic is intended, but a compound is formed during the process.—(2.) The simple tincture of iodine.—(3.) Yes.

A. P. S. (London).—The resolution of the Council respecting the "Student's Prize" will be found in the Transactions of the Society for the present month.

Chemico.—Stone-ware vessels are made which would answer the purpose.

J. C.—We cannot give the information required.

Mr. Headlam's Medical Bill.—The Council will duly consider all the provisions of this Bill which relate directly or indirectly to the rights and privileges of Chemists; with a view of deciding whether any verbal amendments be required.

Mr. Faber's communication has been received. We are much obliged for the suggestion, which will be acted upon next month.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XV.—No. X.—APRIL 1st, 1856.

THE REGISTERS OF THE PHARMACEUTICAL SOCIETY.

As the period for closing the annual registers of the Society is approaching, we take the opportunity of reminding those who desire to have their names included, that the privileges conferred by the Pharmacy Act are granted subject to certain conditions. The primary object of the registers is to confer a distinction upon persons duly qualified for the business of a Pharmaceutical Chemist. The first condition, therefore, is the possession of the requisite qualification, either proved by passing the prescribed examination, or (in the case of the original Members) implied by the recognition of their position in the business prior to a certain date. The other condition, without which the Society could not continue to exist, and which is therefore sanctioned both in the Charter and in the Act, consists in the payment of the fees or subscriptions required by the Bye-laws. It is needless to recapitulate the arguments which have been used with a view of raising a doubt as to the validity of these Bye-laws on the ground of a legal technicality, we only advert to the subject for the purpose of directing attention to the fact, that any doubt which may have existed on the question at issue, is cleared up by the decision of the Judges in the Court of Queen's Bench, and the subsequent confirmation of the Bye-laws by the Secretary of State.

It is now clearly established that the *legal interpretation* of the Act is in accordance with the *intention* of the Legislature (which is not always the case in Acts of Parliament), and that the provisions in the Bye-laws for the support of the Society, by fees or subscriptions, are sanctioned by, and in conformity with the powers conferred by the Act. It is settled by these Bye-laws that the registers shall be made or revised annually, and the time for closing the register for the year is the first of May, after which date no person who has not complied with the conditions specified in the Bye-laws, by paying his subscription or fee, can claim to have his name inserted in that register. The indulgence of four months (the subscription being due on the first of January) is as much as can be given without interfering with the regular business of the Registrar, whose duty it is to present to the Council at the Annual Meeting in May the registers for the current year, made up to the first of May; and the register of Members so prepared is the list which is to be annually published in June.

Greater regularity than has hitherto been observed will be necessary in future, as this list will be referred to for official information, respecting the claim of any person to assume or use the insignia of the Society. The Act provides that any person, on application to the Registrar, and payment of a shilling, may ascertain whether the name of any individual is on the register or list of Members; and when such information is required for evidence in important cases, this mode of obtaining it will be adopted. But for ordinary purposes, the printed list of Members will be used for reference, and the omission of the name of a Member might be attended with an unfavourable impression respecting his professional reputation. Such omission, if resulting from the non-fulfilment of the pecuniary conditions prescribed by the Bye-laws, would not be a ground of complaint; on the contrary, the conditions are much more lenient than those upon which the privileges of some other institutions are enjoyed. For example, in some of the Clubs, the subscription to which is eight or ten guineas per annum, the members are required to pay before the first of April, in default of which they are liable to expulsion, with but little chance of re-election. In the Pharmaceutical Society the power of re-electing Members rests with the Council, and is attended with less difficulty; but during the interval of non-membership, the assumption or use of any sign or title, implying that the party is a Member, or the exhibition of a certificate,

purporting to be a certificate of membership, is illegal, and involves a liability to proceedings under the Act.

A Fellow of the Royal Society enjoys a scientific reputation by virtue of his connexion with that learned body, but is rendered liable to expulsion by the non-payment of the required subscription, and although the Society does not possess special power under Act of Parliament to inflict a penalty for the fraudulent assumption of the title "F.R.S.," a person guilty of this impropriety, whatever might be his scientific attainments, would forfeit his respectability by the imposition.

The importance of the status conferred by the Pharmaceutical Society upon those who are connected with it will continue to increase. In the first instance the distinction was nominal and the advantages prospective; but the title of Pharmaceutical Chemist has already acquired a value by its recognition as a criterion of a certain amount of qualification, and we have reason to believe that at no distant period the Society's diploma or certificate of examination will be required as a passport to situations under Government, and in public institutions.

THE PRIZES OFFERED BY THE COUNCIL OF THE PHARMACEUTICAL SOCIETY.

The number of persons by nature gifted with the true spirit of a philosopher—the love of science for its own sake—is comparatively small. There are many who are capable of appreciating and enjoying intellectual pursuits when brought under their notice, but in whom the faculty of philosophical research is not indigenous. Others, again, have no notion of the value of science except as a "means to an end." If it can be shown that any practical advantage is likely to result from scientific knowledge, if it conduce to success in their business or profession, or to any other tangible benefit, they may be induced to turn their attention in that direction, and by degrees they may probably acquire a taste for that which they had originally undervalued.

Of the rising generation of Pharmaceutists, a majority belong to this latter class. They are entering, or have entered, upon the business selected as their future occupation, and in which they are naturally desirous of acquiring such experience and skill as may give them a fair prospect of success. The communications continually received from all quarters afford abundant evidence of the laudable anxiety that is felt on the subject, and the general tenor of the inquiries has reference to the mode of preparing for examination, with a view of obtaining a certificate of qualification, or the diploma of the Society. The fact that some scientific knowledge is necessary for this purpose, and also for enabling a Pharmaceutist to carry on his business with credit and success, is becoming more generally known, and hence arises an increased desire for improvement. Thus the Society operates directly as a stimulus to education, and indirectly as a means of promoting a taste for science.

The object for which prizes are offered, is to carry out the same process of improvement to a still greater extent—to offer, in another form, a tangible object of ambition, a substantial reward for industry. The emulation thus excited is intended to lead to a higher qualification, a more advanced standard of proficiency, than that which is sufficient as a passport to membership.

The mental training which must be undergone by a successful competitor is likely to be of service to him in his future professional career, and may be instrumental in promoting the advancement of the art and science in which he is engaged. The prizeman is not, in reality, the only successful competitor. One receives the prize, but an indefinite number may derive an advantage from the competition much more important and substantial than even the prize itself. The habit of well-directed industry, the concentration of the faculties for the time on one useful and intellectual study, the interest awakened in the subject, and the store of knowledge acquired, are permanent advantages which cannot be too highly estimated.

One of the prizes offered by the Council, under conditions stated in the Transactions of the Society for the present month, relates to a class of preparations which occupy an important place in the Pharmacopœia. The object of the competition is to arrive at a practical improvement in this branch of the art and science of Pharmacy. In the course of the investigations of the Pharmacopœia Committee, it is not improbable that other subjects may afford similar opportunities for an appeal to the skill and scientific experience of the Members.

The Silver Pereira Medal is offered for an essay on a subject in which our late much-respected Professor was much interested, and on which he contributed valuable information in his works and lectures. This competition, as well as the former, is open to all Members and Associates of the Society.

The Botanical Prize for 1857 is confined to Associates and Apprentices or Students of the Society, whose age does not exceed twenty-one. It is intended by this Prize to encourage the study of Botany, a branch of knowledge hitherto much less cultivated by Pharmaceutists than its importance deserves. So little was Botany formerly considered an essential branch of Pharmaceutical education, that in the early Examinations of the Society it was found necessary almost, if not entirely, to exclude it from the Minor Examination, and although some of the questions had reference to the botanical characters of plants, it was understood that deficiency in the answers on this subject would not *alone* be a sufficient ground for the rejection of a candidate. By degrees this laxity has been diminished, and since the passing of the Pharmacy Act, Botany has been regularly included in the programme of the Minor as well as the Major Examination. Much, however, remains to be done in raising this branch of knowledge to its proper place in the curriculum of Pharmaceutical education. The experience of the Board of Examiners on this head proves that those who have not paid attention to botany during their apprenticeship find great difficulty in acquiring even such a superficial knowledge of it as to enable them to pass the most lenient examination, and that candidates who have passed most creditably and satisfactorily are those who have availed themselves of such scanty opportunities as they may have been able to seize amid the duties of their apprenticeship.

It would be in vain to attempt to give the present generation of Pharmaceutical Chemists an efficient knowledge of botany, but we may reasonably hope to infuse into the minds of our successors a due appreciation and a practical knowledge of the structure, characters, classification and properties of plants, especially those which are comprised in the Materia Medica. The collection of a herbarium will oblige the student to acquire an acquaintance with the rudiments of Botany, and this knowledge will greatly facilitate the study of the plants more especially belonging to his department.

It is proper to state, that although the Council are empowered only to make arrangements for the current year, it is in contemplation to offer this Prize annually, as a permanent inducement to apprentices and students to devote their attention to Botany. Those who are now in the first or second year of their apprenticeship may have little prospect of competing successfully for the Prize at present offered, but if they commence at once, which we urgently advise, in the course of a year or two they will not only have acquired a good elementary knowledge of the subject, but will have learned the localities of all the important plants in their neighbourhood, and the best methods of preserving them. These are the chief elements of success, which will enable them to be more fortunate at a future time.

It is also necessary to bear in mind that in all cases when a prize is offered, it is with the understanding that a certain amount of merit is expected, and that the Council reserve to themselves the right of withholding the prize, in case no candidate should in their judgment attain the requisite standard.

POISONING.

The art and science of poisoning has assumed an aspect which is every day becoming more serious. The increasing frequency of the crime, the cunning and skill displayed by some of the criminals, the employment of all the appliances of science for concealment, as well as for detection, the difficulty of proof even under circumstances of strong suspicion, invest the subject with a mysterious responsibility, a share of which rests upon all parties concerned either in the sale and administration of poisonous medicines, or in the medico-legal investigation which follows the death of each victim.

The first question in a case of suspected poisoning is "Where was the medicine (or poison) obtained?" and the chemist or apothecary whose name is on the label of the suspected bottle is immediately put upon his trial at the bar of public opinion. Unless he can satisfactorily exonerate himself, not only from guilt, but even from suspicion of the want of due caution and forethought, he finds himself the object of a very unenviable notoriety. If the sale of the poison be proved, every circumstance connected with the transaction, the conversation which occurred at the time, the date, and all other particulars must be fully investigated and reported. Facts subsequently developed, but not known to him at the time, are often thrown in the scale to his disadvantage; as it is well known that a discerning public is extremely clever in discovering, after a misfortune has occurred, how it might have been prevented. It is not at all surprising that the deductions in these cases are sometimes erroneous and unfair. After it was known that Mr. Sadleir had swallowed several ounces of oil of bitter almonds on Hampstead Heath, some persons wondered how any chemist could have been so indiscreet as to sell so large a quantity. This, however, was calculated rather to disarm suspicion than otherwise, for who could suppose that a gentleman well known, and occupying such a position in society, would swallow half a pint of oil of bitter almonds? In fact, much credit is due to the chemist in this case for the precautions which he took, as he refused to sell the oil until he had communicated with Mr. Sadleir, and received his written order; he gave the most explicit caution respecting the dangerous properties of the oil, and several labels with the word "Poison" were pasted on different parts of the bottle. A man who would not be safe under such precautions would require to be always tied to his mother's apron-string, and should never be allowed to go shopping unless under the charge of a keeper or police-constable. A person asking for a pennyworth of arsenic would be more likely to be suspected than one bringing a written order for 14lbs.

In the Leeds case it transpired that Mr. Dove asked a variety of questions respecting the effects of strychnia, whether it was the poison used by Palmer, whether it could be detected, &c. Such questions might excite suspicion, but similar questions are continually asked in reference to passing events, by persons who may desire information from mere curiosity.

It must be obvious to every one, that after the publicity which has been given to the mode of administering strychnia, its effects, and the difficulty of detection (as compared with mineral poisons), the greatest caution is necessary in regard to this substance. The plea that cats are inconvenient or dogs troublesome, would not be a guarantee of safety in the sale of strychnia. Nothing short of an order from a medical man would, we imagine, satisfy an ordinary jury, and after what has recently occurred, it would appear that even this security is not absolute.

During the excitement which prevails on this subject, and while strychnia is uppermost in the public mind as the "fashionable domestic poison," especial care is necessary in regard to this substance under any circumstances. We have heard it suggested that this and other deadly poisons of the same class might be removed from the list of Materia Medica, and the sale prohibited; but here arises a question—Where are we to stop? Small would be the list of medicines,

if all were to be excluded which in dishonest hands might be made available for criminal purposes. The only practicable safeguard to the public is the proper qualification of all persons who administer or deal in such substances, and the adoption in each case of precautions which the experience of the Pharmaceutical Chemist may suggest, such as requiring the authority of a medical order, or ascertaining that the purchaser may safely be trusted, always giving due instructions as to the caution required, and pasting proper labels on the bottle or package.

There is another feature in these poisoning cases which is much to be regretted —we allude to the party spirit which is too often manifested in the toxological investigation. Scientific men are engaged on both sides, and the testimony of each is more or less influenced by a bias towards the side on which the witness is retained. Without any intention of unfairness or deviation from the plain matter of fact, it is difficult to divest the mind of the tendency to believe that to be true which is desired. The legal advocate does not disguise the fact that the object of his ambition is a VERDICT, and strong indeed must be the evidence against him to induce a counsel to throw up his brief. Among professional *witnesses*, this consideration ought not to be allowed to have any weight. Yet we see in some instances an obvious deviation from strict impartiality.

The case of Palmer, which is now agitating the public mind, has assumed the character of a party question. John Smith, solicitor for the defence, admits without disguise (see correspondence in the *Observer* of March 23rd), "my object is to save the life of William Palmer." With this object he wrote a series of letters to the law officers of the Crown, and the Secretary of State, requesting further particulars respecting the details of Dr. Taylor's evidence, in order that he might have an opportunity of producing counter-evidence at the trial. These efforts were unsuccessful, all the minute details of evidence being reserved for the trial. We understand considerable excitement prevails in another quarter, and it would appear that the *esprit de corps* in an institution with which the accused was formerly connected, has added to the number of partisans who are endeavouring to procure his acquittal by raising a doubt as to some part of Dr. Taylor's evidence. Such controversies in a scientific investigation are discreditable, and calculated to defeat the ends of justice. Justice demands that every practicable means should be adopted to avoid either of the two following evils: first, That of inflicting capital punishment on an innocent man, upon fallacious circumstantial evidence; secondly, That of letting loose upon society a murderer, who may be indebted to his own cunning and the skill of his advocate, for a defect in the chain of evidence. An acquittal under the latter circumstances would afford direct encouragement to future criminals, and in all probability cause the sacrifice of the lives of many innocent persons. The fear of this result would be no justification of the punishment of a suspected person without every facility having been afforded for a full and impartial defence; but we maintain, and have on previous occasions expressed the same opinion, that the scientific evidence in such cases should be obtained from witnesses not employed as partisans, but acting on behalf of the Crown in the capacity of an independent commission. The result ought to depend not upon the balance of professional skill in special pleading and assurance in brow-beating witnesses, but on a calm and dispassionate investigation of the facts by an impartial tribunal, the skill of the counsel being confined to the arrangement and elucidation of the facts proved, in order that each may have due prominence, and that no material point may be overlooked by the jury.

PROFESSIONAL ETHICS.

WE are running a race with America in the endeavour to raise the character and status of the Pharmaceutical profession. In this country, as in that, one of the chief obstacles to success is the prevalence of quackery. The patronage of

certain quack medicines by members of the medical profession, and the variety of types of the disease (quackery) observable in the sliding scale, from the puff nicely wrapped up to the puff direct, considerably increase the difficulty. Any regulations which may be adopted under the term "professional ethics," must be voluntary. Those who may think proper to impose such restrictions on themselves, may persuade but cannot compel others to act on the same principle.

It would be impolitic, even if practicable, at the present time to attempt the introduction of stringent regulations on the subject. Old associations and confirmed habits can only be changed by degrees, and all that can be done in promoting the desired result is an occasional allusion to the principles on which a correct and satisfactory code of ethics might be founded. In so doing we are obliged to give instances by way of illustration, avoiding, whenever it is possible to do so, any personal remarks or criticisms which might give offence. We believe that it would be found in the end to be conducive to the interest as well as to the credit of the pharmaceutical body to make a stand against quackery, to take high ground, and acquire a professional status. By degrees it would be found that the sacrifice of a questionable notoriety is more than compensated by the increased respect and confidence of the public.

In expressing this opinion, we may be told, by way of objection, that it sounds very well in theory, but would not bear the test of practice; that a large number of our Members, probably a majority, cannot afford to abstain from the customary methods of pushing their trade; and that in some districts the sale of patent medicines constitutes a considerable proportion of the business. That this is the case at the present time we are not prepared to deny. The prejudice of the public in favour of secret medicines obliges many chemists to deal in them, however desirous they may be to discourage quackery. It may be difficult to effect a complete change in an old-established business, depending, as it does, on the wants and predilections of the customers; but we advise the young men of the present day, those who have not yet commenced on their own account, to consider seriously the policy of beginning on the right principle; to aim at legitimate dispensing and retail business, founded on the reputation for superior intelligence and education, instead of aspiring to notoriety as patent medicine vendors and quack doctors.

The subjoined article, extracted from the *American Journal of Pharmacy* for January, 1856, may be interesting to our readers, as it shows the analogy between the progressive state of the Pharmaceutical profession in that country and our own, and the efforts which are being made to discourage quackery:—

PHYSICIANS AND PHARMACEUTISTS, AND THEIR RELATIONS.

BY J. M. MAISCH.

It was about a year ago, that to a Philadelphia Sunday paper, the question was put, Whether apothecaries were to be regarded as professional men or as tradesmen? To which that journal unhesitatingly replied, tradesmen. We must confess that we were, and still are, dissatisfied with such an answer; opinions like this, promulgated by the press, cannot fail to injure the science of Pharmacy—at least, to do injustice to the true and faithful pharmaceutist. Druggists, properly so called—that is, dealers in drugs—certainly are tradesmen, inasmuch as their business consists chiefly in buying and selling, some manufacturing included. The *wholesale druggist* is a merchant, who has to study the influence of political and natural events on the market, the facility of procuring his merchandize, the time and manner to get it off again; he has to study the proper mode of preserving drugs in an unaltered condition, or sometimes to turn them profitably into pharmaceutical or technical preparations; in a word, the wholesale Druggist is a merchant, whose success, like that of other merchants, depends chiefly, if not entirely, on the quantity and quality of his commercial knowledge.

Vastly different from him is the apothecary, who, of course, if he does not mean anything else but a *retail druggist*, as he styles himself, is a small tradesman, a shopkeeper, who, instead of buying coffee by the sack and sugar by the barrel, and

retailing it by the pound or half-pound, as required, buys Epsom salts by the quarter hundred-weight, and senna by the five pounds, and retails them out by three or six cents worth; or he understands to buy a dozen of patent medicines, selling them from the sixpenny candy stick to the $1 50 cholagogue or $3 00 catholicon; and if he chances to know that magnesia may be obtained from Epsom salts, and that opium contains morphia, he will call himself a *chemist*, and if he knows how to mix rhubarb and magnesia, or how to dissolve tartar emetic in water, he thinks himself justified to affix to his title *apothecary*. Alas! there is more truth in these remarks than we would wish to believe. We have heard of a reverend gentleman, who never before had mortar and pestle in his hand; of a boarding-house keeper, who well knew how to treat his boarders, but never had any idea of what a tincture was, both buying drug stores in two large cities. One, however, soon found out that it "would not do," and conscientiously returned to the pulpit; the other still holds out, doing a good business in nostrums of all sorts, having established the "principal depôt" for some of them with his drug shop, where, sad to say, half a dozen of prescriptions weekly find their way. We know a retail druggist, the owner of a fashionable store, who would not prepare Zittman's decoction in a metallic vessel, because he was afraid the "acid of the mercury would eat up the metal of the vessel." It will be remembered, that during the boiling down of this preparation, calomel, enclosed in a bag, is suspended in the liquid.

These and other instances we know to be true; but what do they prove? They simply prove that there are a number of tradesmen or shopkeepers among the "retail druggists," who regard the vocation of the apothecary as a gold-mine to be explored by any one who feels inclined to do it, without reference to pharmaceutical knowledge or ignorance. Fortunately, however, a number of pharmaceutists know the duties and requisites necessary for them to come up to the demands of the science of modern pharmacy—and a science it has become now, especially since chemistry has been elevated really to a science, with sound foundation, and has commenced its researches with the matter of the terrestrial bodies; pharmacy, working with such, could not be placed out of its reach, and under the influence of chemistry it was to be built up to a science itself.

Some have spent a lifetime faithfully trying to keep pace with the rapid progress of pharmacy and its appertaining sciences, and—we know such cases—have not been able to reap the fruit of a quarter century's labour and research; while others, who never had an idea of what pharmacy is, set up a "drug shop," being contented to make money by retailing nostrums, and attempting even to cure, "on the most scientific principles," after having read that a proper dose of rhubarb acts on the bowels, and that corrosive sublimate and other mercurials are sometimes given in venereal diseases, do not stop to reflect how many lives are probably dependent daily on their ignorance or unscrupulousness. Might it not be well for such persons to try, by close study and practical exercises, to gather at least some necessary pharmaceutical knowledge? And surely it would not be too late; with a firm determination, a man might accomplish it.

We have read, in a history of the apothecaries by A. Phillipe, that about the beginning of the fifth century, the preparers of medicine separated from the physicians as a different class, but were scorned, being regarded as higglers. Could it be otherwise now, in the face of the numerous abuses perpetrated on science and the public, if pharmacy had not obtained a higher degree, corresponding with the actual progress of the natural sciences?

But how guard against, how remedy such evils?

In most parts of Europe a strong restriction exists, in the conducting of the apothecary business, a heavy license being imposed on it, a tradition from the middle ages. But what secures there to the pharmaceutist high respect is, the necessity of a professional education, of a thorough acquaintance with theoretical and practical pharmacy, of passing stringent examinations, previous to being recognized as such, and their own zeal for scientific researches. Such is not the case here. The exercise of pharmacy is not restricted by law; it is *legally* considered a trade, and it depends on pharmaceutists themselves, on the physicians, and also in a great measure on the public in general, to make pharmacy what it might be; on the public and the physician, in as much as they need not entrust the life of the patient to a man in whose skill, knowledge, and experience they cannot bestow the necessary

confidence; and on the pharmaceutists, who ought to turn their eyes to a proper education, and allow their apprentices the time and means required for obtaining a complete knowledge of all that belongs to pharmacy, and who among themselves ought to cultivate a collegial feeling, forming pharmaceutical associations for a mutual exchange of opinions and observations.

An elaborately-written paper, by Mr. Parrish, on "Pharmaceutical Education," was published some time since in this Journal, and it claims the attention of every pharmaceutist. The noble objects of the "American Pharmaceutical Association" should not be ignored by any one who does or intends to stand on a level with those acquirements that may be properly demanded of a real apothecary. Well-educated men, thoroughly acquainted and conversant with all that appertains to pharmacy, cannot fail to win the entire confidence of the public, and to convince the conscientious observer, that apothecaries are something besides merely tradesmen, and that *pharmacy is an art and a science.*

The vocation of the physician is certainly a noble and exalted one; it wants a man, in the fullest sense of the word, to visit the sick-room, to witness the sufferings of human beings in their various forms ; to distribute comfort and help. But when pretenders attempt to make that high calling their own, we really do not know whether we should get angry at their deceitfulness or pity the credulity of the mass. If an adventurer of some kind or other finds that he cannot succeed, or does not make money fast enough, what is easier for him than to rent a room, calling it an office, and to put up a sign on which you may read in large characters a name with M.D. affixed to it ? The newspapers open their advertising columns to any one who has money to pay for the advertisement. And what advertisements these often are ! There you may find enumerated horrid diseases that are not, and have never been dreamed of, that are the scourge of mankind, slaying thousands; and that never demanded a single victim, because they only exist in the brain of the newly inaugurated doctor and in *his* medical dictionary. There you may find descriptions of diseases which might just as well serve to explain the symptoms of a nervous headache, an over-filled stomach, or of consumption, or some other lingering disease. The evils perpetrated by such quacks are really unaccountable; it is not only their misunderstanding diseases of the patients who place confidence in them; not only the danger arising from over-doses of medicines, the proper doses of which they cannot recollect or adjust to a peculiar case, the constitution, age, &c., of the patient; but it is, in a great degree also, the neglect or the fear of doing anything at all, that may be productive of the worst consequences. We know a case that recently occurred, and is a striking example of a treatment of the latter sort. A young man suffering from general debility and impotency produced by excesses, called on a self-styled physician who liberally patronizes the press, having sometimes two or three advertisements at the same time in a number of the newspapers. The doctor took to electricity to cure his patient, and gave him a wash for strengthening the organs, into which he had previously put the *one* pole of his electric battery, and which on examination, as the physician assured us under whose treatment he afterwards placed himself, proved to be nothing but clear water. That the doctor demanded good pay for his professional (?) services need not be said.

Such impostors know how to do "business"—how to entice the unfortunate sick to seek their advice. Besides the enumeration and description of diseases, they promise to cure infallibly and radically. They herald their own success by announcing the number of patients cured annually, and of those who were recommended to them by the first physicians of the country ; they trumpet their skill by publishing the thanks of cured patients, which are manufactured by wholesale ; they give proof of their modesty by denouncing all quacks, and by abusing all those who copy their advertisements in order to deceive the public; and they are liberal and charitable, for they profess to attend to poor people free of charge, and to pay particular attention to those recommended to them by other physicians. It is astonishing how bold a face they are able to put on !

But there is another set of quacks known better to the public than the class before mentioned ; we mean the numerous proprietors and originators of patent medicines. There seems to be a perfect mania all over the country for "inventing" and introducing new, never heard-of nostrums, which, to make them valuable, are

often called by such barbarous names as to render a proper pronunciation highly difficult. We will not attempt to depict the means used for introducing and keeping them before the public, to expose the folly of an attempt to cure various diseases by one and the same remedy, or to reduce the whole Pharmacopœia to a half-dozen preparations, which would cure any disease the human frame is subject to. A number of these nostrums have gone to the dead, and we sincerely wish all the living ones may soon follow them. We could not suppress a pitying smile the other day, on reading an article written expressly for the defence of patent medicines. The manufacturer of secret medicines, it was said, certainly puts something of efficacy in it, but not in sufficient quantity to do harm, even after a continuance for some time; he pays large amounts to the press for advertising, printing, &c.; in short, he is a benefactor of mankind. The nostrums are calculated to be family medicines, and as there are nostrums that cure everything, and hundreds for each class of the different diseases, the attendance of a physician is quite unnecessary; one quack of this sort cures more patients in a week than many physicians in a year. Their medicine is "recommended by the faculty," and their boldness, of course, is the best proof of its efficacy, notwithstanding the promulgation of a volume of testimonials from persons that sometimes never lived, and the numerous cases in which the nostrum had no effect at all, or made the sickness worse than ever.

The question of quackery in its two forms is certainly an important one, and the proper way for its suppression is still open for discussion. The wealth accumulated by the shrewd manufacturer; the money they can spend for hiring an unscrupulous press, or using the advertising space of the honest and conscientious press; the position in society attained by some quacks; the fame of some as practitioners before turning to quackery; the standing of others as members of scientific societies, or as editors of general scientific or medical journals; the usage of some physicians, otherwise opponents to quackery, to prescribe nostrums, either from a knowledge of their composition or from faith in the authors of the same; the readiness of even high-standing and learned men to give recommendations for the use of nostrums; but, above all, the thoughtlessness of those who wish to save the expenditure of money for the services of physicians, and still have to pay several times that amount for the recommended merchandize of the quacks; all these circumstances combined tend to keep the secret medicines afloat, and to add new ones almost daily to the old stuff.

To put down quackery, requires the efforts of all true-hearted men, and especially of physicians and pharmaceutists. We know it cannot be overcome all at once, but must fall by degrees, and we have no doubt it will. When questioned about the efficacy of quack medicines, we should not hesitate to state our opinion of nostrums in general, to refuse any sort of recommendation such as—some are said to have derived benefit from it;—but to recommend the afflicted to seek the advice of some physician in whose knowledge and skill we can place confidence. This, we think, should be the beginning; if necessary, an explanation why the same medicine cannot answer for so many diseases, or always for the same disease, which is modified by the constitution, the sex, habits, manner of living, &c. Declining on the part of apothecaries to keep quack medicines for sale has, in most cases, been rewarded by the entire confidence of the practising physician and a corresponding increase of prescriptions—the legitimate pharmaceutical business. So much we are assured of, that if medical societies would take a bold stand against nostrums of any sort, and act in conjunction with the various pharmaceutical societies, to remedy this evil would then be much easier. As yet the voices in opposition to quackery, and especially the nostrum quackery, are thinly scattered throughout the country; but seldom the editor of a newspaper ventures to publish an article opposed to it. The harmonious action of the practising physician and the dispensing pharmaceutist is necessary, to be productive of much good—their recompense would be the increased confidence of the public.—*American Journal of Pharmacy*, January, 1856.

THE ADULTERATION OF FOOD, DRUGS, &c.

Mr. Scholefield's Committee having resumed the examination of witnesses, reports of the evidence have appeared in the newspapers. We think it unnecessary to publish a lengthened report of the statements of each witness, many of which are a repetition, with slight variations, of facts previously noticed, with occasionally a correction or contradiction, denoting either a difference of opinion among the witnesses as to the facts, or different modes of stating the case, according to the aspect from which it is viewed.

In the *Times* of March 3rd, we find the following digest of the general tenor of the evidence:—

"The witnesses before this Committee assure us that the tradesmen of London are playing pantomime in real life and in deadly earnest; that we are the poor dupes, and that we have to pay for the sport which we give—to pay, not only with our money, but with our lives. For the worst of it is, that the articles we purchase are, they tell us, not merely diluted, they are adulterated—positively, abominably, poisonously. There is scarcely, they say, a single article of daily use which it is possible to procure genuine from ordinary shops. We ask for bread, and we receive a stone; for coffee, and we receive chicory; for chicory, and we receive burnt carrots and powder of dried horses' liver; for oil of almonds, and we receive prussic acid, to heighten the enjoyment of the dessert by adding a little risk to it."

This summary of the nature of the evidence is followed by a few remarks, the truth of which admits of no denial, to the effect that a share of the responsibility rests with the public—the purchasers of the various articles prepared in obedience to their demand for that which is cheap.

"Throughout the country there is no greater curse than the rage for cheapness—the false ideas that most people have as to what is really cheap."

This, however, is not stated as any extenuation of the crime of adulteration but as a mode of explaining the extent to which it is practised. The writer proceeds to observe:—

"Surely any one of respectability, sufficient to gain credence for his assertion, would make a fortune were he to set his face strenuously against all imposture, and determine to sell only genuine articles, even at a slightly enhanced price. So far from the enhanced price depriving him of custom, people would crowd to the shop, and might even be too ready to fall into a trap—the belief that the increased price is a sufficient guarantee for a better article. We continually pay at increased rates for the sake of far less advantage. What we want is to get the very thing we ask and pay for. Strange that, with all the wealth of the world at our call, there are very few in this metropolis who can get a glass of pure water to drink, or a bit of genuine bread to eat!"

If this suggestion be put forward as an original idea, founded on the evidence before the Committee, it sufficiently demonstrates the fallacy to which that evidence leads, when literally translated into plain English. Experience has taught us, and experience equally taught our forefathers, that there is a definite relation between honest principle and success in business; that although we may occasionally meet with a lucky rogue, or an upright man who is unfortunate, yet these are exceptions to the general rule, handed down by our ancestors, in the old maxim, that "Honesty is the best policy."

There are honest men as well as rogues in every trade. There are also persons who, without the intention of acting dishonestly or the ability to detect imposition, fall into the snare laid for them by others, and buy what the market affords, according to the demand—which demand is regulated by the price their customers are willing to pay, and the kind of articles which are found to give satisfaction. This latter class of persons will be benefited by the disclosures which have been made before the Parliamentary Committee, for, although the evidence contains but little if anything that was not previously known by those who had paid attention to the subject, many of the facts elicited

are new to the public at large, and will probably induce purchasers to be more careful and fastidious with regard to quality, and less unwilling to pay a fair price.

We subjoin a few extracts from the evidence in a condensed form:—

Feb. 29th.—Dr. Alfred Taylor commenced by alluding to the poisonous colours used in confectionery, such as Scheele's green, red lead, &c. The oil of bitter almonds and almond flavour he considered dangerous, and quoted several cases of accidental death from an over-dose. The prussic acid, although one of the constituents of the oil, might be separated from it without impairing its value for flavouring custards, &c. The word *poison* should otherwise be invariably printed on the label. Hair-dye containing oxide of lead had been known to produce partial paralysis by the absorption of the lead. Dr. Taylor confirmed generally the statements of other witnesses respecting the colour of anchovy sauce, pickles, &c. In the bread which he had examined, he had not found any appreciable quantity of alum. In small quantities alum would not be injurious, but it was a question whether the introduction of this or any other substance into the system day after day might not be hurtful. He had examined unfermented bread, but had not detected anything injurious in it. The substance most likely to occur was arsenic, from the hydrochloric acid. Some of the gelatine sold to the public was unfit for human food, and had created a prejudice against the name, but the best kinds were as good as Russian isinglass, although the substitution of gelatine for isinglass, when the latter is asked for, would not be justifiable. Dr. Taylor gave a decided opinion as to the injurious effects of many quack medicines. He confirmed many of the statements of other witnesses with regard to coffee and some other articles of food, but thought there had been some exaggeration in the evidence published. He made a few suggestions of a practical nature, and thought the publicity given to the subject had already given a check to the practices. The desire to sell cheap articles in accordance with the demand, had been one of the principal incentives to adulteration.—Mr. James Abess, a wholesale grocer, considered the evidence of previous witnesses, respecting the adulteration of tea and coffee, had been much exaggerated. The mixture of chicory with coffee was preferred by the public, and sold without disguise as a mixture.

Feb. 29.—Dr. Lewis described the state of the law in France for the prevention of frauds and adulteration, by means of a board of scientific men, to whom reference could be made in cases of suspicion.—Professor Queket confirmed some of the statements of other witnesses. He had once found brains in milk, but the usual adulteration was water. Dr. Thomson had found the constituents of alum in seventy-eight samples of bread, but not in the form of alum. He thought it important to draw attention to this distinction, and did not consider the use of a small quantity of alum injurious, as it was decomposed in the process of baking; and the statement that crystals of alum had been found in bread, was fallacious. The addition of alum in any considerable quantity might be injurious, but he believed almost all the bread sold in London by bakers contained more or less alum. He had examined samples of beer, but had not usually found any adulteration. Coarse sugar was sometimes used, and he had once detected orange-peel, but had not found strychnia, cocculus indicus, or quassia. He suggested the propriety of extending the laws relating to the adulteration of bread and beer to other articles of food, and thought the appointment of a public prosecutor desirable.

March 5.—Mr. Lindsay Bligh, Analytical Chemist to St. Mary's Hospital, had the duty of examining drugs for the Hospital. Had not found drugs in their natural state adulterated, but sometimes of inferior quality. Preparations he had frequently found much adulterated; but since it had become known that they were subjected to analysis, the quality had much improved. He considered that adulteration, when practised, was done fraudulently, and not by accident. He had found drugs in Paris better than in England, which he attributed to the superior education of the French chemists, and the system of examination adopted. He thought some legislative enactment necessary. Mr. W. Bastick was of opinion that adulteration was most extensively practised, either from fraud or imperfection in the manufacture. This was done abroad by the makers, and at home by wholesale druggists. Essential oils were generally adulterated with turpentine, or other oils; musk with sawdust and chopped horses' tails; white precipitate with corrosive sublimate and

chalk; red precipitate with red lead; honey with flour and syrup. He also directed attention to the "compound powders," and gave a formula said to be adopted for a powder called "*gentian compositus*," containing only one-seventh of gentian, from which he said any medical man would find his prescription produce a very different effect from that which he intended. He also gave a formula for turmeric powder. He thought the majority of the retail chemists could not detect the adulteration of drugs sold to them; at the same time there was no doubt many were able to do so, and sold adulterated articles knowing the fact. He was quite prepared to endorse the statements of Dr. Hassall and Dr. Normandy, and recommended legislative interference. He also read a recipe which had been published for making port wine. —Mr. Baiss, wholesale druggist, denied some of the allegations of former witnesses, such as the habitual mixture of sawdust with powders in the mill, and the sale of gentian compositus as genuine gentian powder. It was possible that such compounds might be obtained if ordered of the grinders, but no respectable wholesale druggist kept them in stock.

March 7th.—Mr. W. Emmerson, of Leeds, represented a company which had been formed for grinding flour on account of the extensive adulteration. The company had been very successful, and had greatly improved the quality of the flour and reduced the price. He thought legislative interference necessary.—Mr. Ferrand, book-keeper to a corn-mill society in Rochdale, gave similar evidence of the success of that society, which had discontinued the use of alum with good effect. He also mentioned another society at Rochdale for the sale of articles of food generally, on account of the prevalence of adulteration.—Dr. Challis, of Bermondsey, had examined many samples of bread containing alum. Did not agree with those who think that alum is so changed in the process of baking as to be harmless. He considered it injurious to the stomach, and had found crystals of alum in bread. There was no necessity to use alum; a little more salt would answer the same purpose, without causing injury. Rice was also used in bread, which he considered a fraud. In the course of his practice he had seen evidence of the adulteration of beer by some intoxicating substance, the nature of which it was scarcely possible to detect by chemical process. He directed attention to the injurious effects resulting from the sale of diseased meat, and stated cases in which the adulteration of mustard had caused disappointment when used medicinally; which remark was also applicable to many drugs, and he thought powers might be given to vestries, under Sir Benjamin Hall's Act, to interfere in cases of adulteration.—Mr. R. Usshur, a grower of English rhubarb at Banbury, having been accused by some former witnesses of selling a spurious article, inferior to foreign rhubarb, quoted Dr. Pereira in defence of English rhubarb, and stated that it was recommended by many medical men, and that the demand was increasing.—Mr. R. Gay, superintendent of the mustard department of her Majesty's Victualling Yard, Deptford, said, that on account of the universal adulteration of mustard, the Government had lately undertaken the preparation of it. He had been a drug-grinder for thirty years prior to his present appointment. It had always been possible to obtain genuine mustard, but it was mixed to suit the public, as the genuine mustard became black by keeping, and the public did not like it. It was sometimes mixed with flour, ginger, and cayenne. In some Government stores he had detected fifty per cent. of gypsum in the mustard before the present plan had been adopted. The mustard now supplied to the navy was pure. The presence of turmeric in mustard could be detected by spirit of ammonia giving a brown colour. While in the drug-grinding trade he had much experience in adulteration, being obliged to do it. Sometimes the sawdust and other things were sent to him to be mixed—in other cases he was ordered to supply them. Many of his customers disliked the practice, but were obliged to do as others did, on account of the competition. The use of sawdust was universal in powders. He alluded chiefly to the neighbourhood of Leeds, where he had carried on the business, and could not positively state what was the practice in London.

March 12.—Dr. Neligan, of Dublin, said he believed drugs were less adulterated in England than in Ireland. In Ireland no person except an apothecary could compound medicines. He thought the adulteration of drugs was chiefly between the wholesale druggist and drug-grinder. In reference to a recent case of accidental poisoning, he mentioned that the College of Physicians of Dublin had recently issued an order that dangerous medicines should be kept in angular or square

bottles, and those of a harmless nature in round bottles. He did not think the adulteration of food was practised to any great extent in Ireland. Much injury was done by the unrestricted sale of quack medicines.—Mr. P. Ripley, a tea-broker, said the chief adulteration of tea in China was that of the "lie tea," the sale of which had risen from 100,000lbs. to 500,000lbs., but the demand having ceased, it was no longer sent to this country. He contradicted the statement that green tea was coloured with copper.—Mr. Weston, tea-broker, confirmed the statement of the last witness to the effect that the adulteration of tea is not practised to any great extent.—Mr. Locock, wholesale tea-dealer, gave similar evidence. He did not believe tea was adulterated by retailers, and it was generally sold in a very good state.—Mr. F. Crace Calvert, of Manchester, gave evidence on the adulteration of flour with potato starch, rice, maize, and also with unsound and damaged flour. He noticed the adulteration of oatmeal, milk, &c. The guardians of poor-law unions encouraged such frauds by habitually taking the lowest tender. He gave many instances of the adulteration of drugs, and explained the state of the law in France on this subject.—Mr. R. J. Richardson, Inspector of Nuisances near Manchester, gave evidence as to the injurious effects of diseased meat, and the sale of such as was unfit for human food.—The Committee adjourned until Wednesday, April 2nd.

Since the above was in type, we have observed another article on the subject in the *Times* of March 22nd, written in the same strain as the former, and equally calculated to develop "the reign of terror" in the public mind. Here is a sweeping anathema on the public! for it must be remembered that the public is equally the criminal and the victim—each person in turn is buyer and seller according to the nature of his business or his wants for the time being:

"There is not a single article representing the animal, vegetable, or mineral kingdoms, and used for the nutriment of man, for his apparel, for his necessities, his caprices, or his delight, which has not been publicly vended among us in an adulterated, damaged, or noxious state. Our meat has been diseased, and has induced carbuncles; our white fish has been green, and our green vegetables white; our sugar has been sand or lime; our wheaten bread potatoes and alum; our mustard has been flour; our beer has been drugged, and our drugs poisoned. The very air which we breathe and the water which we drink have partaken of the universal pollution. The rich, who are enabled by their position and their wealth to deal only with tradesmen of the highest class, have but little idea of the extent to which this adulteration has prevailed."

If this be a correct literal version of the evidence, and the evidence a true statement of facts, it is wonderful that any person is left alive to tell the tale. But if it be the object of the remarks above quoted to bring the evidence and the labours of the Committee into ridicule, we have only to say that the subject is too serious and important to be dealt with in that way. The object of the Committee is to collect information, to elicit the truth, with a view of ascertaining what remedy can be found for abuses, the existence of which is not disputed. The evidence translated into the language of the *Times* is very far removed from the truth, calculated to mislead those who take it as sober earnest, and to disgust those who read it as a joke.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

FINANCIAL STATEMENT,

From January 1st to December 31st, 1855.

RECEIPTS.

	£	s.	d.
Balance in Treasurer's Hands	322	13	7
19 Life Members' Fees	173	5	0
Benevolent Fund:			
Subscriptions 50 3 6			
Interest 125 7 3			
	175	10	9
Government Securities, Interest	198	13	2
395 Town Members' Subscriptions 414 15 0			
1854 Country Members 1946 14 0			
317 Associates 166 8 6			
285 Apprentices 149 12 6			
	2677	10	0
Fees:			
10 Pharmaceutical Chemists 68 5 0			
22 Assistants 107 2 0			
54 Apprentices 121 16 0			
5 Fines 5 5 0			
	302	8	0
Arrears of Subscriptions	104	1	0
Lecture Fees	19	19	0
Sale of Journals	4	1	0
" Catalogues	3	14	0
Balance of Costs from Messrs. Brace and Colt	63	6	11
	£4045	2	5

EXPENDITURE.

	£	s.	d.
Life Members' Fund Investment	188	11	3
Benevolent Fund:			
Investment 264 19 4			
Gratuities 36 0 0			
	300	19	4
Repayments	7	7	0
Tin Cases for Certificates	13	4	0
Conversazione, Pharmaceutical Meetings, &c.	39	9	7
House Expenses	40	6	4
Rent, Rates, and Taxes	350	11	4
Fixtures and Fittings	5	2	0
Postage	48	19	11
Stationery	10	16	5
Printing	63	5	3
Collector's Commission	32	17	4
Board of Examiners	33	12	0
Grant to Branch Society in Scotland	54	8	1
" " " Liverpool	50	0	0
Travelling Expenses, Country Members of Council	89	6	8
Salaries	462	10	0
Wages	169	0	0
Journals	700	0	0
Delivery of Journals	121	9	6
Library	39	2	0
Museum	22	16	2
Lecture Sundries	6	4	9
Professor of Materia Medica and Botany, including duties as Curator in his department, and payment of Assistant	304	3	4
Professor of Chemistry and Pharmacy, including duties as Curator in his department, and payment of Assistant	325	0	0
Subscription to Royal Botanical Gardens	21	0	0
Prizes to Students attendg. lectures	9	8	6
Advances to Messrs. Bracc & Colt, Solicitors	202	9	8
Balance in Treasurer's hands	333	2	0
	£4045	2	5

We, the undersigned Auditors, have examined the accounts of the PHARMACEUTICAL SOCIETY, and find them correct, agreeably with the foregoing Statement, and that, as shown by the books of the Society, there was standing in the names of the Trustees of the Society, at the Bank of England, on the 31st of December, 1855:

		£	s.	d.
On account of the General Fund	New 3 per Cents	6036	7	1
Benevolent Fund	3 per Cent. Consols	4684	17	7
Life Members' Fund,	3 per Cent. Consols	1203	3	7
And at that date there was due to the Life Members' Fund		47	5	0

JOHN BRADLEY,
D. J. BAILEY,
W. MANNING WATTS,
FRANCIS WARD,
Auditors.

February 10th, 1856.

LIST OF MEMBERS, ASSOCIATES, AND APPRENTICES (*continued*).

MEMBERS.

Ipswich	Chenery, William H.
London	Guy, George H.
	Lawrence, Frederick
Stroud	Blake, William F.

MAJOR EXAMINATIONS.

Brevitt, William Yates	Birmingham
Lawrence, Henry	Richmond
Payne, John	Leighton Buzzard

MINOR EXAMINATION.

Reynolds, Arthur	Watton

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	TOWNS.
Barton, Frederick	Mr. Wilson	Canterbury
Bowler, Harvey F.	Mr. Hitchcock	Colchester
Dallas, Clement	Mr. Gall	Woodbridge
Farrar, William	Mr. Heming	Sunderland
Jackson, Warwick	Mr. Hitchcock	Colchester
Kemp, Francis	Mr. Smeeton	Leeds
Kent, Frederick W.	Mr. Randall	Southampton
Owles, Edward J.	Mr. Palk	Southampton
Reynolds, Freshfield	Mr. Martin	Guildford
Rosselloty, John C.	Mr. Couch	Islington
White, John G.	Mr. Ransom	Hitchin
Whitehouse, George H.	Mr. Tonge	York
Witherington, Henry	Mr. Witherington	Worcester

AT THE COUNCIL MEETING,

Held on the 5th of March, 1856,

MR. J. T. DAVENPORT, PRESIDENT, IN THE CHAIR,

The following regulations were adopted:—

PRIZE ESSAY

On the Preparation of Cerates, Ointments, and Plasters.

The use of some ointments and cerates is limited in consequence of the tendency of the unctuous substances contained in them to become rancid or to undergo some chemical changes, which render their application to diseased surfaces objectionable. This tendency to change is promoted by the presence of metallic oxides, salts, and other medicaments, which are frequently used in such applications, but all unctuous media are not equally affected under like conditions. It is desirable in the formulæ for cerates, ointments, and plasters, that such media should be selected as are least liable to change, or that suitable means should be indicated for preventing, as far as possible, the tendency to change here noticed. Some of the formulæ at present in use are considered to be defective in these particulars.

A SILVER COUNCIL MEDAL

is offered for an Essay on the Preparation of Cerates, Ointments, and Plasters, comprising the results of the experimental investigation of the questions referred to above, a full description of the defects which occur in the cerates, ointments, and plasters of the three British Pharmacopœias, a notice of any peculiarities in the formulæ for similar preparations contained in foreign Pharmacopœias, and suggestions for improved formulæ.

Competitors for this prize must be Members or Associates of the Pharmaceutical Society. Each Essay, with a motto attached to it, is to be sent before the 1st of August, 1857, in a sealed envelope, addressed to the Secretary, Mr. G. W. Smith, 17, Bloomsbury Square, endorsed, "Essay on the Preparation of Cerates, Ointments, and Plasters," and the writer is to enclose his name in another envelope, with the motto he has adopted written on the outside of the envelope. The adjudication will be made by the Council; but the prize will not be awarded unless an Essay is submitted to them which they consider deserving of such a distinction.

PRIZE ESSAY

On the Development and Structure of the Starch Granule.

A SILVER PEREIRA MEDAL

is offered for an Essay "On the Development and Structure of the Starch Granule, and the Means of distinguishing the more important Commercial Starches."

The subject to be treated as follows:—

1st. A general view to be given of all that is at present known of the Development and Structure of the Starch Granule, together with original observations on these points, and critical remarks upon the views generally entertained in reference thereto.

2nd. The Microscopical appearances of the different Commercial Starches to be described, their chemical and physical characters, and the means of distinguishing one from another. In this portion of the subject, particular notice should be taken of the following starches:—Potato, Wheat, Rice, Maize, West Indian Arrow Root, East Indian Arrow Root, Tous les Mois, Sago, and Tapioca. The other starches need only be briefly referred to.

The competition to be open to all Members and Associates of the Pharmaceutical Society. Each Essay, with a motto attached to it, is to be sent on or before the 1st of August, 1857, in a sealed envelope, addressed to the Secretary, 17, Bloomsbury Square, endorsed, "Essay on the Development and Structure of the Starch Granule," and the writer is to enclose his name in another envelope, with the motto he has adopted written on the outside of the envelope. The adjudication will be made by the Council, but the medal will not be awarded unless an Essay is submitted to them which they consider deserving of such a distinction.

BOTANICAL PRIZE FOR 1857.

A SILVER COUNCIL MEDAL

is offered for the best Herbarium, collected in any part of the United Kingdom, between the first day of May, 1856, and the first day of August, 1857; and should there be more than one collection possessing such an amount of merit as to entitle the collectors to reward, a second prize, consisting of a Bronze Medal, and also Certificates of Merit, will be given at the discretion of the Council. In the event of none of the collections possessing such an amount of merit as to warrant the Council in awarding Medals or Certificates, none will be given.

The collections to consist of Phanerogamous plants and Ferns, arranged according to the Natural System of De Candolle, or any other natural method in common use, and to be accompanied by lists, arranged according to the same method, with the species numbered.

The collector to follow some work on British Botany (such as that of Babington, or Hooker and Arnott), and to state the work which he adopts.

The name of each plant, its habitat, and the date of collection, to be stated on the paper on which it is preserved.

Each collection to be accompanied by a note, containing a declaration, signed by the collector, to the following effect:—The plants which accompany this note were collected by myself between the first day of May, 1856, and the first day of August, 1857, and were named and arranged without any assistance but that derived from books.

In estimating the merits of the collections, not only will the number of species be taken into account, but also their rarity or otherwise, and the manner in which they are preserved, and should a specimen be wrongly named, this will at once be erased from the list.

The collections to be forwarded to the Secretary of the Society, 17, Bloomsbury Square, on or before the first day of August, 1857, endorsed, "Herbarium for Competition for the Botanical Prizes."

If required, the collections will be returned after competition, with the exception of that of the successful competitor for the Silver Medal, which will be added to the Herbarium of the Society.

No candidate will be allowed to compete unless he be an Associate, Registered Apprentice, or Student of the Society, or if his age exceed twenty-one years.

PHARMACEUTICAL MEETING,

Wednesday, March 5th, 1856,

MR. J. T. DAVENPORT, PRESIDENT, IN THE CHAIR.

The following donations were announced:—

Journal of the Society of Arts, from the Society.
Journal of the Photographic Society, from the Society.
The Literary Gazette, from the Publishers.
Dr. Hope's *Practical Chemists' Guide.*
Tracts, by Robert Boyle, 1674, from Mr. Coles.
Fruit of the Trapa bicornis, from Mr. Hanbury.
Specimens of Antimony Ore, and Crude and Refined Antimony, from Mr. Terry.
Oil of Emu, from Mr. John Trix, of Exeter.

This oil is described by the donor as being obtained from the *Dromacus Novæ Hollandiæ*. It is used by the natives in cases of rheumatism. The bird is said to yield abundance of the oil.

The following communications were made:

ON THE DISTINCTIVE CHARACTERS OF THE ROOTS OF ACONITUM NAPELLUS (MONKSHOOD) AND COCHLEARIA ARMORACIA (HORSE-RADISH).

BY ROBERT BENTLEY, M.R.C.S., F.L.S.,

Professor of Botany and Materia Medica to the Pharmaceutical Society of Great Britain.

Several fatal cases of poisoning having occurred by the accidental substitution of monkshood, or, as it is commonly called, aconite root, for horse-radish, I thought it might not be uninteresting to the members of the Pharmaceutical Society to have their attention directed to the characters by which these roots might be readily distinguished from each other.

Aconitum Napellus (Monkshood).—The root of this plant is a biennial. It is formed on the side of the root of the previous year during the summer and autumn, and the old root then gradually decays. About the months of October, November, December, and January, when the leaves are absent, it possesses the greatest activity, and hence the above months are the best time to collect

it when required for medicinal use, and also that period in which its poisonous effects are the most intense. The time, therefore, when the root is most poisonous is that when it is alone liable to be substituted for horse-radish for when the leaves appear the two roots are not likely to be confounded. In length the root of monkshood averages about five inches, but sometimes it is as much as eight, or even ten inches if grown in a very luxuriant soil. In form it resembles the cultivated carrot, or more nearly the common parsnip, being broad at its upper extremity and tapering gradually downward to a small thread-like point (see figs. 1 and 2); the upper extremity, on an average, being about the thickness of the middle finger, but frequently an inch or more in diameter. Sometimes the main root divides into two or three divisions, each of which resembles the other (such as is represented in fig. 7 of *Aconitum Japonicum*). It passes perpendicularly into the earth, giving off from its sides numerous cylindrical fibres, about the thickness of a common knitting needle. In colour, externally, the main root and its fibres are coffee-coloured, or dark brown, or some shade of brown. Internally, it is white. It has no particular odour, being merely earthy. Its taste is at first bitter, but in a few minutes a very peculiar feeling of numbness and tingling is perceived in the lips, cheeks, and tongue.

Cochlearia Armoracia (Horse-radish).—The root of this plant is a perennial. It is commonly a foot or more in length, giving off from its sides a number of irregular branches of variable sizes (see fig. 3), and terminating frequently at its upper extremity in two or more divisions, from which the leaves arise (see fig. 4). In diameter above it varies from about half an inch to two inches or more; as commonly used, it is about the thickness of the thumb or middle finger. In form it is enlarged above at the crown or point where the leaves are given off; it then slightly tapers for a short distance, and becomes ultimately more or less cylindrical, and instead of tapering gradually to a point, as the root of monkshood, it frequently maintains nearly the same thickness to its lower extremity, and then commonly divides into two or more branches. In other cases, however, it does taper somewhat from its upper to its lower extremity, but by no means, in any instance, so evidently as the root of monkshood. In colour, externally, it is white with a tinge of yellow, and whitish internally. Its odour, when scraped or bruised, is exceedingly penetrating and acrid, exciting frequently sneezing and secretion of tears. In taste it is very pungent, especially in autumn and spring, accompanied by a bitter or sweet flavour, according to circumstances; as, for instance, the season at which it is collected, the manner in which it has been cultivated, and the soil in which it is grown.

The more important distinctive characters between the two roots may be thus tabulated and contrasted:—

MONKSHOOD.	HORSE-RADISH.
Conical in form, and tapering perceptibly to a point.	Slightly conical at the crown, then cylindrical, or nearly so, and almost of the same thickness for many inches.
Coffee-coloured, or more or less brownish, externally.	White, or with a yellow tinge.
Odour merely earthy.	Odour especially developed upon scraping, when it is very pungent and irritating.
Taste at first bitter, but afterwards producing a disagreeable tingling and numbness.	Bitter or sweet according to circumstances, and very pungent.

The roots of monkshood and horse-radish may be also distinguished by the different appearances they present when scraped with a knife. Thus the former will then be observed to be of a succulent character, and the scraped portions

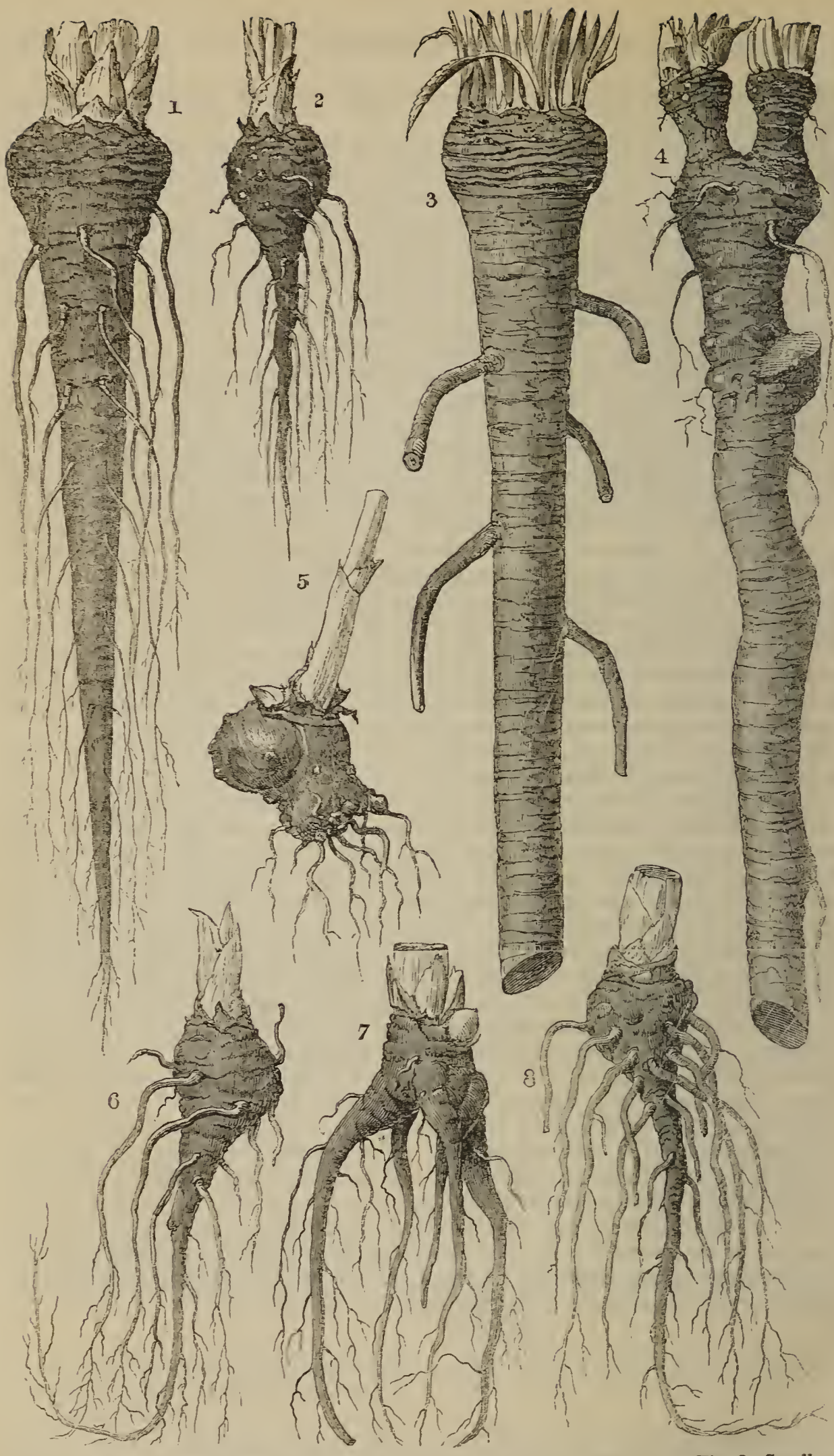
soon to acquire a pinkish or reddish hue, whilst the latter scrapes firm and dry, and does not alter in colour.

From the above description of the roots of monkshood and horse-radish, it will be seen that instead of resembling each other, as is commonly supposed, they have scarcely any appearance in common, presenting evident and well-marked distinctive characters in their form, general appearance, colour, odour, and taste. The only resemblance between the two roots, and this but a slight one, is in the appearance of their crowns, but even supposing it possible to mistake them so far, the other characters of distinction are so well marked, that no difficulty ought to arise in distinguishing between them.

Such being the case with these roots, I thought it possible that some other species or varieties of the genus Aconitum might possibly resemble horse-radish root; and as many varieties are commonly cultivated in our gardens, and as these frequently possess similar poisonous properties to monkshood, although more feeble, their substitution would equally account for the fatal accidents that have occurred. I have accordingly obtained from the Gardens of the Royal Botanic Society in Regent's Park the roots of twelve other kinds of aconite, specimens of which are now on the table. They are as follows:—*Aconitum Japonicum*, *A. Sinense*, *A. cœruleum*, *A. Akermannii*, *A. paniculatum*, *A. pyrenaicum*, *A. ochroleucum*, *A. neomontanum*, *A. uncinatum*, *A. Cammarum*, *A. Pallasii*, and *A. Lycostonum* (see figs. 5, 6, 7, 8). It will be seen that the roots of all these species or varieties which are commonly cultivated in our gardens, resemble more or less that of the *Aconitum Napellus* (monkshood) in their colour and general appearance, the only difference between them and it consisting in the fact that some of them present a roundish or irregular knobbed root instead of a conical one; so that it would be even more easy to distinguish them from horse-radish.

Besides the above species, the roots of a number of others have been examined by me with the same result.

The distinctive characters between the various species of aconite and horse-radish roots being therefore so evident, it seems most extraordinary that a cook could by any possibility confound them; for in preparing them for the table, one could not but observe the difference in colour, form, and odour. I should think it quite as reasonable if any one were sent into the poultry-yard for a fowl that they should bring a duck, or even a turkey, for the substitution in this case would not be anything more remarkable than that one should confound monkshood root with that of horse-radish. There is this difference, however, in the two cases. Thus, persons are taught by observation and education the distinctive characters of our domesticated animals and birds; whilst in regard to substances derived from, or parts of plants, they are totally ignorant, although ignorance in the latter case is attended with far more injurious consequences than in the former, leading as it does frequently, as we have seen, to distressing and fatal accidents. Let us hope, therefore, that the time is not far distant when such knowledge will be considered as essential, and will accordingly form a branch of the education of the young, whatever be their rank or station. Till so desirable an end can be arrived at, we must do our best by the aid of Museums, such as those of the Pharmaceutical Society, of Kew, and of the Royal Botanic Society of London, to give as much information as we are able by the exhibition of vegetable substances and parts of plants, in common use in the arts, manufactures, and domestic economy.



Explanation of the Figures.—Fig. 1. Large root of Aconitum Napellus. Fig. 2. Small root of ditto. Fig. 3. Root of Horse-radish, as commonly sold. Fig. 4. Irregularly shaped root of Horse-radish. Figs. 5 and 6. Roots of Aconitum Paniculatum. Fig. 7. Root of Aconitum Japonicum. Fig. 8. Root of Aconitum Cammarum. The roots of the different species of Aconite are drawn about half the natural size; those of Horse-radish about one-third.

ON THE CONSTRUCTION AND MANAGEMENT OF AQUARIA FOR THE PRESERVATION OF LEECHES.

BY MR. ALFRED ALLCHIN.

Having received a great many applications for particulars respecting the Leech conservatory, which I exhibited at the last Conversazione held at this Institution, I am induced to offer the following suggestions to those who are desirous of adopting that method of keeping leeches:—

A vessel, eighteen inches long, twelve inches wide, and ten inches deep, will be found to be of a size suitable for the preservation of any number of leeches not exceeding two hundred. This vessel may be made of slate and glass, or the slate may be replaced by wood lined with zinc, and the latter has the advantage of being cheaper and more portable than slate. I have found the following arrangement to answer the purpose well. The frame-work, together with the bottom and two ends, are made of birch-wood, and the top and two sides of glass. The inner surface of the wood, which otherwise would be exposed to the water, is covered with thin zinc, the metal being turned at the edges into the grooves prepared for the reception of the glass plates, and fixed there with the cement by which the whole is united. The cement commonly used being composed of a mixture of white and red lead, that part of it which is exposed to the water should be covered with shellac dissolved in spirit, and made into a paste with chalk. The water is thus prevented from coming into contact with any part of the wood-work, or becoming contaminated by the lead cement. The cover of the tank should consist of a wooden frame with a plate of glass fixed in the top, and having a rim with a piece of perforated zinc of about one inch in depth let in, for supplying air. This cover should fit on to the top of the tank like a shouldered box, so as to prevent the escape of the leeches, and at the same time to exclude dust.

Having thus prepared the tank, some coarse river sand, well purified by washing it with water, is to be mixed with small pebbles, and this mixture is to be introduced so as to cover the bottom of the tank to the depth of about an inch. A water plant is now to be selected. I have used the *Valisneria spiralis*, but this, not being a native of this country, it is sometimes difficult to obtain, in which case some other water-weed may be substituted for it, such, for instance, as the *Anacharis*, which chokes up many of our ponds and rivers. The roots of the plant are to be inserted in the sand, and the tank is then to be filled with clean river water. The next requisite is the water-snail, two or three of which should be introduced to consume the decaying vegetable matter and the conferva that grows on the sides of the vessel. I prefer the *Plenorbis corneus* for this purpose, having observed that this animal devours the slimy matter given off by the leeches, and does not, as the *Limnæa stagnalis* does, eat the *Valisneria* in preference to substances which it is most desirable to get rid of.

These preparations being made, before introducing the leeches I consider it better to let a week or two elapse, during which time the plant will have thrown off some oxygen with which the water will be charged; and with a view to the complete fulfilment of this object, it will be found advantageous to commence these aquaria in the spring of the year rather than the autumn. The best situation in which to place the tank is in a room, near to a window. If it were placed in too strong a light, such as it would receive in the open air, the water would be likely to become turbid from excessive growth of confervæ. Even under the conditions I have recommended, the glass sides of the tank will sometimes become more or less opaque, partly from the growth of confervæ, and partly from the effect of the leeches attaching themselves there. This unsightly appearance may be removed by cleaning the glass with a piece of rag or a nail-brush.

It is a common remark among Pharmaceutists, that the sale of leeches involves much trouble and little profit; a remark which, before adopting the

plan here described for keeping them, I was fully prepared to coincide with, as it was not unusual for me formerly, when my leeches were kept in the old way, to lose six or eight in a day or two from my little stock. But I am certain that if the aquarium system were generally adopted, the complaint referred to would cease to exist. I have now tried it for two years, and the result has been quite satisfactory. I now scarcely lose more leeches in a year than I did formerly in a couple of days. In fact, the aquarium supplies to the leech the conditions under which it lives in its natural state, the plant affording oxygen so essential to animal life, and in return receiving its required supply of carbonic acid.

Mr. Redwood inquired whether it was found necessary to maintain any definite proportion between the animal and vegetable life in the aquaria.

Mr. Allchin had not found any difficulty in that respect. One or two plants sufficed for a large number of leeches. The number of snails required depended upon the quantity of confervæ present, and this was influenced very much by the light to which the aquarium was exposed.

In answer to other questions, Mr. Allchin stated that he had not found it practicable to keep fish with the leeches; the latter attacked the fish, especially their eyes, to which they fastened themselves, and they soon destroyed their prey in this way. He had originally expected that the leeches would propagate in the aquarium, but in this he had been disappointed.

Mr. Redwood said that some years ago experiments were made by M. Soubeiran, Jun., of Paris, on the propagation of leeches, and he found, with a view to that object, that it was necessary to keep them in ponds having clay or mud banks, which the leeches could enter. He thought that some modification of the aquarium might be made, by which this condition would be fulfilled.

The Chairman stated that the gentleman who had proposed to read a paper that evening on Crystallography, had been prevented, by a domestic affliction, from keeping his engagement. Under these circumstances it was proposed that one of the subjects which had occupied the attention of the Pharmacopœia Committee should be brought before the meeting. He would therefore request Mr. Redwood, the Secretary to the Committee, to introduce the subject of the

DISTILLED WATERS OF THE PHARMACOPŒIA.

Mr. Redwood said this subject had recently come under the consideration of the Pharmacopœia Committee, and it was thought desirable to elicit information on some doubtful points from Members of the Society who were practically engaged in the preparation of "distilled waters." There were several methods by which medicinal waters were made, three of which were recognized in our Pharmacopœias. These waters were solutions of essential oils in water, and the old, and still generally adopted, mode of preparing them, consisted in submitting the plants, or parts of plants containing the essential oils, to distillation with water. This, with the addition of a small quantity of spirit, was the only mode of preparation recognized in the Edinburgh Pharmacopœia. In the London Pharmacopœia, spirit was altogether omitted, but while some of the waters were ordered to be made by distilling the vegetable substances containing essential oils with water, others of them were allowed to be made either in that way, or by mixing the essential oils with powdered silica, then adding this to distilled water, mixing them well together, and finally filtering the liquor. In the Dublin Pharmacopœia, all the medicinal waters, with one exception, were directed to be made by adding alcoholic solutions of the essential oils to distilled water. The exception was in the case of cherry-laurel water, which was made by distilling the leaves with water. Besides these modes of preparation, medicinal distilled waters were sometimes made by putting the essential oils into a still with water, and distilling them together. They were also sometimes

made by passing steam through a vessel containing the vegetable substances yielding the essential oils. Then again, with reference to these vegetable substances, some of them, such as roses and elder flowers, were sometimes used in the recently gathered state, and sometimes they were mixed with salt (pickled) and often kept for several months before using them.

Now, the question was, which of these modes of operating was the best? Viewing these waters as mere solutions of essential oil in water, some persons considered that nothing more was required for producing them in a perfect state, than to bring together their two constituents under conditions the most favourable to their intimate admixture. In accordance with this view, what more was required than to diffuse the oil, in a minutely divided state, through the water, as was effected by the use of powdered silica, according to the instructions of the London Pharmacopœia, or by the use of spirit, as directed in the Dublin Pharmacopœia? These processes, if they yielded products as good as those obtained by distillation, had a manifest advantage, in being easily performed by every Pharmaceutist, at any time of the year, and upon any quantity of materials. But the products thus obtained were not generally considered to be equal in quality to those produced by distillation from the plants or parts of plants yielding the essential oils. This difference in the quality of the products was ascribed partly to the inferior quality of the oils used as compared with those existing in their natural receptacles in the vegetables yielding them, and partly to the presence, in those waters prepared by distillation, of other vegetable matter, besides the oil, which is carried over in the process. There were some cases, such as those of cinnamon water and rose water, in which no doubt was entertained that they should be made by distillation from the bark or flower of the vegetables yielding them, and not from the essential oils. In other cases, such as that of peppermint water, much difference of opinion existed, many persons preferring that made from the oil, which was thought to be more pure and agreeable in flavour than that made by distillation from the fresh plant. Then again, in the preparation of rose water and elder flower water, by some operators the fresh flowers, and by others the pickled flowers, were considered to yield the best products.

These were points on which the Committee thought it desirable to obtain the opinions of as large a number as possible of practical Pharmaceutists. Any results of practical experience, if communicated to the Committee by letter or otherwise, might be read before a meeting of the Society, and made subject for discussion on some future occasion.

There was also another subject connected with the distilled waters which had occupied the attention of the Committee. Two out of the three British Pharmacopœias gave formulæ for the preparation of cherry-laurel water. This water was but little used in this country, although, in common with the analogous bitter-almond water, extensively employed on the Continent. The active ingredient of these waters was hydrocyanic acid, which was associated in the water with the oil produced in the process adopted for its preparation. It had been remarked, in reference to these waters, that they were less liable to undergo change of strength from keeping than was the case with mere solutions of hydrocyanic acid of the same strength, which seemed to indicate that they might be advantageously substituted for diluted hydrocyanic acid in medical practice. The subject had been brought before the Committee, but it appeared to involve some considerations in reference to which further information was required. In cases of poisoning with crude oil of bitter almonds, the effects produced had been observed to be less sudden and powerful than might have been anticipated from the quantity of hydrocyanic acid contained in the oil. It was a question, therefore, whether the therapeutical action of the hydrocyanic acid was not modified by the hydride of benzoyl with which it was associated in the crude oil of bitter almonds, and, if so, to what extent this modification occurred. This, which was a medical question, appeared to stand

in the way of any specific proposition being made for the more general substitution of bitter almond or cherry-laurel water for diluted hydrocyanic acid. The question, however, was one involving several points of interest, some of which were strictly chemical, and required further investigation. There was reason to think that part at least of the hydrocyanic acid in oil of bitter almonds was in some state of combination. If so, what was the nature of the compound, and in what way, and to what extent, did it influence the permanence of the hydrocyanic acid?

Mr. Allchin thought, in reference to the subject of distilled waters, it was important to consider whether the excess of oil which generally passed over with them in their preparation ought to be entirely separated or not. He thought excess of oil should be separated, but he preferred effecting the separation without filtration. Waters prepared by distillation from the vegetable substances in their natural state were certainly more grateful to the stomach, and generally more efficient than those made from the essential oils. With regard to peppermint water, although when distilled from the herb it was less agreeable than that made from the oil, when recently made, yet if kept for two or three weeks the disagreeable flavour disappeared.

Mr. Whipple considered the practice of preparing medicinal waters from the essential oils very objectionable. Not only were the oils frequently much adulterated, but independently of this, the waters prepared from them speedily became mucilaginous and sour. Medicinal distilled waters should be made by distillation from the fruits, barks, &c., of the plants yielding the oils. No spirit should be added to them, and they ought not to be filtered, but preserved in a semi-opaque state, as drawn, in which state they were super-saturated with oil. Bucholz had shown that all distilled waters, if not super-saturated with essential oil, become mucilaginous and ultimately sour. He thought the formulæ of the London Pharmacopœia would admit of much improvement.

Mr. Bentley would regret to see the substitution of cherry-laurel water for hydrocyanic acid, the very uncertain strength of the former rendering its use in some cases dangerous. It was well known that the cherry-laurel leaves yielded very different quantities of hydrocyanic acid at different periods of the year, so that there could be no certainty in the strength of the product obtained, even if the quantities of ingredients were the same. He thought the adoption of either cherry-laurel or bitter-almond water as a substitute for hydrocyanic acid, would, in a scientific point of view, be a retrograde movement.

Mr. Bell quite agreed with what had just been stated. He had known serious accidents to occur from the use of bitter-almond water, the strength of which was very liable to variation.

Mr. Redwood hoped that no one would go away with the impression that any such proposition had been made to the Committee, as that cherry-laurel or bitter almond water of indefinite strength should be substituted for hydrocyanic acid of definite strength. There would of course be no difficulty in determining the exact amount of hydrocyanic acid contained in the water when first drawn, and then diluting it to a fixed standard of strength, as was always done in preparing medicinal hydrocyanic acid.

PHYTOLOGICAL CLUB.

17, *Bloomsbury Square*, *March* 12*th*, 1856.

ROBERT BENTLEY, F.L.S., PRESIDENT IN THE CHAIR.

Donations were announced of *Knappia agrostidea*, from Mr. J. Ereant, Jun., of Jersey, and a very valuable collection of 729 Plants, from Mr. J. W. Gissing. Of these, 149 species were new to the Herbarium of the Club. The thanks of the meeting were unanimously voted to the donors. It is requested that in future all applications for plants be sent to the President, 17, Bloomsbury Square.

Mr. Hanbury made some observations on the extinction of the Palm tree in Syria, and quoted an extract from Stanley's *Sinai and Palestine.*

Some discussion followed, in which several instances of the agency of man could be traced, in causing the increased rarity of trees in large districts, whereby the climate was considerably modified, as in the south of France and in America.

It was announced that the next meeting would take place on Wednesday, April 9th, at half-past eight P.M.

PHARMACEUTICAL SOCIETY,

NORTH BRITISH BRANCH.

A Meeting of the Pharmaceutical Society was held in Edinburgh, at 72, Princes Street, on Friday evening, 7th current, at 9 o'clock,

MR. JAMES GARDNER, PRESIDENT, IN THE CHAIR.

The Meeting was a very crowded one, and the following address was delivered:—

ON PHARMACY AS A BRANCH OF TECHNOLOGY,

BY GEORGE WILSON, M.D., F.R.S.E.,

Regius Professor of Technology in the University of Edinburgh, and Director of the Industrial Museum of Scotland; Honorary Member of the Pharmaceutical Society of Great Britain.

I have much pleasure in again addressing the Pharmaceutical Society, which is doing so much to raise the standard of education among the members of an important profession, and I desire cordially to congratulate you on the success which is attending your useful labours.

I trust that none present will think that there is any purpose of undervaluing pharmacy, in speaking of it as a branch of technology. Technology is but another name for industrial science, *i. e.*, the science of industrial art; and as it includes all the useful arts, it necessarily assigns a prominent place to an art so useful as pharmacy. As I have already, in my Inaugural Lecture as Professor of Technology, discussed the general nature of the science I profess,* and have also brought its claims, and those of industrial museums, before the general public of Edinburgh,† I shall, on this occasion, limit myself entirely to the technological relations of pharmacy.

Pharmacy is the art of preparing medicines, and must accordingly be an art as old as the need of medicines—in other words, as old as sickness, suffering, and death; and therefore, if not as old as Adam, at least as old as Cain and Abel. Its beginnings are hidden from us by the darkness which broods over the cradle of all the arts, and this darkness is deepened by peculiarities inseparable from every department of knowledge dealing with a thing so sacred and so mysterious as life. I refer to this at the outset, because I wish to insist strongly upon the fact that pharmacy, in ancient times, was pre-eminently a secret and even mystic art; and the question I wish to discuss before you this evening is this simple one—Whether will it conduce most to the progress of pharmacy, that it should remain, as of old, a secret, blindly empirical art, or that it should become an open, scientific art? It has always been eminently technical, dealing in practices which it dogmatically authorised. Is it desirable that it should now become technological, and give a reason for all those practices? The existence of this Society is an answer in the affirmative to the latter query. I seek, accordingly, not to create, but to deepen your conviction that pharmacy must henceforth be a child of the light, not a child of the darkness. Allow me, then, briefly to contrast the ancient and the modern aspect of pharmacy, that we may fully satisfy ourselves that we are now on the right path for its improvement; and, to prevent vagueness, let us date ancient pharmacy from the death of

---

* *What is Technology?* Published by Sutherland and Knox, Edinburgh. 1855.

† *On the Objects of Technology and Industrial Museums.* Reprinted from the *Weekly News.* Edinburgh: Sutherland and Knox. 1856. Those interested in the subject are also referred to a paper *On the Relations of Technology to Agriculture*, printed in the Highland and Agricultural Society's Journal for March, 1856.

Queen Elizabeth and the time when James VI. of Scotland became James I. of England.

The four leading characteristics of ancient pharmacy were—1. Mystery, or rather mysticalness. 2. Secrecy. 3. Empiricism. 4. Technicality. I speak here of honest pharmacy, and I use none of these terms in a reproachful sense. It was not altogether the fault of the ancient art of preparing medicines that such qualities characterised it; nor need we wonder that they still, in some degree, attach to it.

I. In the first place, pharmacy was unavoidably mystical, for in all ages, and most of all, in the earliest of which secular history furnishes any record, sickness, suffering, and death were felt to be, as in truth they are, mysterious things, and occult and sinister influences were imputed to the sun, the moon, the winds, earthquakes, volcanoes, and other great natural agents. Evil spirits were assumed to be the frequent causes of disease. Wicked men, prompted by malignant demons, often induced fatal distempers in those they hated; and witches, in league with Satan, could slay whom they pleased. It was vain to expect that diseases originating in such sources could be overcome without weapons more formidable than the pestle and mortar. A witch's curse could only be met by a saint's prayer. Charms and amulets were the only trustworthy protection against the evil eye. The juice of a plant was an excellent medicine, if the plant were plucked at full moon, but a deadly poison if it were plucked when the moon was crescent.

In short, diseases of supernatural origin could be subdued only by remedies of supernatural origin, and as no one could pretend to settle to what extent human beings are under the influence of celestial and infernal powers, whilst Scripture revealed the existence of fallen spirits permitted to tempt man, and pointed to disease and death as essentially produced by sin, it was impossible to prevent credulity and superstition from sheltering their follies under the desecrated wing of religion. The infallible result of an extravagant dread of supernatural causes of disease, was a desire to discover in all medicines supernatural powers of cure. The mere natural properties of a plant, a mineral, or an artificial chemical compound, however striking, were not diligently studied or much heeded. If it really were potent as a medicine, then some supernatural cause of its potency must be discovered, and as soon as such supernatural cause was discovered, or was supposed to be discovered, the powers of the medicine were in greater part or altogether imputed to the mysterious element in it.

As supernatural qualities, however, or the semblances of such, do not strikingly appear even in the most marvellous bodies, it became necessary to invent them where they could not be found; and this was done, often in perfect good faith. If men will begin, as many men do, by first asking whether a thing be wonderful, and, secondly, whether it be true, they will soon make wonderfulness the standard of truth, as much of the history of Mesmerism, Spirit-rapping, and Table-turning, sufficiently illustrates. Our pharmaceutical ancestors largely acted on this principle, and accumulated in their laboratories a miscellaneous assemblage of medicines, each of which had some marvellous quality to recommend it.

I will refer to but one kind of marvellousness, namely, rarity. The mere scarcity of a substance stands in no relation to its medicinal properties. Magnesia would not become a deadly poison if all the amount of it in the world were a few grains; nor would morphia become a harmless powder if every existing grain of it became a ton. But our ancestors seem to have regarded rarity of occurrence in nature as a sign of peculiarity of property, and many forgotten medicines had no virtue but this rarity to recommend them. Thus, for example, it was held that the dew which fell on the first morning of May, had special medicinal virtues; and you may read in early numbers of the Philosophical Transactions, grave discussions by the Members of the Royal Society concerning the therapeutic value of May dew. May, like Christmas, comes but once a year; and if summer dew be a medicinal thing, then the dew of the first summer-day ought, on the principle of rarity, to be pre-eminently medicinal. So at least our ancestors thought; and they also thought, that because you could not always, even in their cruel days, get hold of the hand of a hanged man, therefore his hand should be held to possess signal healing qualities, and diseases which would yield to nothing else, might be expected to give way, if the fingers of an executed murderer were laid upon the morbid part.

So also, a "child's caul" was not a thing to be procured at will, but only at rare intervals; and, therefore, husk of embryo-life though it was, which had fulfilled its

purpose, and should have been consigned to decay, it was senselessly prized as a thing which could secure length of days to whomsoever possessed it.

Again, the touch of a monarch's hand cannot be commanded every day, but when it can be had there must be strange virtue in it; and so we read of scrofula as the king's evil, because kings could heal it, and learn that thousands were "touched," and many cured by Charles the Second's royal hand. It would be difficult in these days to convince any one that Queen Victoria is not a better monarch than the second Charles ever was, but Her Majesty herself would refer the most scrofulous amongst us to the dealers in cod-liver oil, were we to ask her to grant us the benefit of her queenly touch.

Once more: the quality of rarity fortunately belongs to many hateful things, which we are glad in these days do not obtrude themselves upon our notice; but our ancestors, in their search for medicines, sought out those rarities, and welcomed them. Witness, for example, the horrible specifics which they extracted from the most forbidding animals, and even in the most revolting way, from the corrupting bodies of dead men. I avoid all details, but that you may appreciate the difference between the pharmacy of King Charles's and Queen Victoria's days, listen to the recipe for a medicine which was so famous in the time of the Stuarts, that as a last resource it was given to Charles the Second in his dying moments;* and had acquired so great a celebrity that even in the days of George I. it went by the name of the "English Drops."

The recipe I read to you admits of the more exact contrast with the recipes of the present day that it happens to be recorded by a namesake of my own, who flourished in the days of the Stuarts, and published in his ninetieth year the work from which I quote. It is entitled, *A Compleat Course of Chymistry, containing not only the Best Chymical Medicines, But also Great Variety of Useful Observations.* Fourth Edition. *By George Wilson, Chymist. London*, 1721.

"*Elixir Cranii Humani.*—Put six pounds of human skulls (grossly powdered) into a retort; lute it, and place it in an open furnace; give a degree of fire every two hours, till no fumes are seen in the receiver; then let all cool and take out the spirit, oil, and salt; the salt that adheres to the receiver wash off with water, and put it to the other; which return into a clear retort, and rectify the spirit, oil, and salt in a gentle sand heat, so often (always in clean retorts) till they perfectly unite. Put four ounces of this united spirit, oil, and salt into a retort (or cucurbit) with one pound of rectified spirit of wine; again rectify all in a gentle heat till they are united (which five or six cohobations will perform), of this put one pound into a matrass, and two ounces of the moss of human skulls; let them digest two or three days; then put it into a glass, and stop it well.

"It is a noble medicine against madness, convulsions, and hysterick fits. It operates by sweat and urine; and the dose is from five to one hundred drops."—P. 305.

This hateful medicine was in high repute, as you may judge from its administration to the dying monarch. Another recipe for it is given in the English translation (4th edition) of the French Chemist Lemery's *Course of Chymistry*, of which I quote a few lines from chap. iv., part 3, entitled "Of the Skull and Brain of Man." The date of Lemery's work is 1720, *i. e.*, the sixth year of George the First's reign:—

"The head, which ought to be used in medicine, should be taken from the body of a strong, healthful young man, newly dead of a violent death, and which has not been interred, that all its active principles may be preserved, of which the most volatile part would fly away in the ground.

"The human skull, dryed, rasped, and powdered, is thought very good for the epilepsie and other distempers of the brain. The dose is from ten grains to two scruples. It operates by its volatile salt.

* * * * *

"We find upon skulls, that have been lying in the open air for some years, a kind of green moss called *Usnea*, which is used in medicine. It is brought from Ireland, where it is common; because in that country, those that are hanged, remain upon the gibbet till they fall off—during which time the flesh and membranes of the head being consumed, this moss grows upon the skull."—Pp. 506-507.

---

* "A loathsome volatile salt," says Macaulay, "extracted from human skulls, was forced into his mouth."—*History of England*, vol. i., chap. iv., p. 430.

Thus it happened that there existed in the formularies of our ancestors a list of highly-prized medicines, some of which, like a child's caul, were worthless charms, or useful only by their influence over vulgar imaginations. Others, like May dew, were like some of the mineral waters of our own day, useful only because you must rise early in the morning and take a long walk before breakfast, if you wished to profit by them. And others, like the elixir of the human skull, were only mixtures of salts of ammonia and the allied volatile bases, and of products of destructive distillation, and could have been obtained of equal potency from less unpleasant sources. As much came to be perceived, indeed, before the preparation of these noisome medicines was abandoned, for the translator of Lemery, after lauding the virtues of the "English Drops, or Antiepileptick Elixir, which is a spirit of the humane head," adds that "those who have a prejudice at the *spirit of the humane head*, may use instead of it the *spirit of hartshorn*."—P. 509.

II. The second characteristic of the older pharmacy referred to, was secrecy. It was secret for at least five reasons :—

Firstly.—The mysticalness of pharmacy compelled it to practise secrecy. Satan and his emissaries, demons, demoniacs, and witches, were enemies to whom it would have been madness to reveal the counter-charms, catholicons, and specifics, with which it was hoped to neutralise or defeat their malignity. It was prudent also not to betray dread of beings so powerful and so wicked, who might revenge themselves upon those who endeavoured to thwart them, even though the endeavour failed. And the very timidity which made a man wear an amulet, or dose himself with a specific, made him unwilling to confess that he put faith in either, or to purchase it openly.

Secondly.—Secrecy attached to the older pharmacy because it was not safe for a man to let the vulgar know that he could prepare powerful drugs, and possessed subtle poisons and infallible cures. He who could render harmless the spells of a witch, was often held to prove thereby only that he was more highly skilled in witchcraft than she ; and to cast out a devil was likely to bring upon him who did, or was supposed to do so, the reproach which was brought against our Saviour—I make the comparison with all reverence—"He casteth out devils through Beelzebub, the chief of the devils."

Thirdly.—Pharmacy was secret, as all the older sciences and arts were, because knowledge was held to be a thing which he who acquired it should keep to himself, not make a gift of to others. Pharmacy was not more sparing in its revelations than the sister arts. All of them long retained the exclusive character which was unavoidably impressed upon them partly by the cloistered isolation of the mediæval monks, to whom, nevertheless, we are under lasting obligations for their conservation of knowledge during the dark ages; and partly by that restriction of artists and workers to particular crafts or guilds, which long remained as a relic of the feudal system.

Fourthly.—Pharmacy was secret on the principle that ignorance or folly will often pass for wisdom if it preserve silence. To render a reason for all the details of his complicated processes, would have taxed the ingenuity of the most skilful pharmacologist, and an air of grave mystery prevented questions to which no reply could be given.

Fifthly, and lastly.—Pharmacy was secret of old, for a reason which makes it secret in some quarters even at the present day. "Skin for skin," said the accuser of men, "yea, all that a man hath will he give for his life." The truth of this needs no demonstration or illustration. Even those who are best prepared and most willing to die, would not grudge any sum which should purchase a drug able to add even a few hours to the lifetime of a beloved parent, or wife, or child, or relative. And so there was a ready traffic in nameless specifics, which I do not doubt their seller often honestly thought were worth the price charged for them, and the buyer rejoiced to procure for so reasonable a sum. And sometimes no doubt both seller and buyer were justified in their faith, and unexpected cures were effected, with new honours to the catholicon which had vindicated its powers. The evil, nevertheless, was an immense one, as we see at the present day, but to this I shall refer more particularly in the sequel.

III. The third great characteristic of the older pharmacy was empiricism. I do not use this word in the sense of *charlatanerie* or quackery, but in its simpler and

original etymological meaning, as denoting practice founded upon experience, as distinguished from practice founded upon theory or principle. The older pharmacy was in this sense empirical or experiential. In the preparation of any medicine, certain processes, which tradition sanctioned, were blindly followed in as nearly as possible the same way every time. The steps of each process were generally needlessly numerous, but the operator was afraid to omit or to vary any of them, as he had no means of determining which were essential, and which superfluous.

Every one is familiar with the pictures of ancient laboratories, representing dark, vaulted, underground buildings, filled with furnaces, stills, alembics, crucibles, and huge glass vessels. The alchymists, who were many of them men of great genius and skill, had nevertheless unavoidably complicated all chemical processes, in obedience to their fundamental principle, that the number of chemical elements or simple substances is exceedingly small, and that they may be changed or transmuted into each other by subjecting them to a certain treatment. The process which should, for example, transmute lead into gold was never discovered, but this only led to the trial of process after process, in hopes that the effectual process would at length be discovered ; and thus the simplest chemical operation came to consist of an almost endless series of digestions, distillations, cohobations, rectifications, applications of fires of the first degree, fires of the second degree, and what not ; so that days were spent in reaching a result which a modern chemist would achieve in an hour. The pharmaceutical chemist imitated the practice of his alchemical predecessors and brethren, and followed a lengthened routine of tedious and often useless manipulations in the preparation of the simplest medicine.

There can be little if any question, indeed, that the belief came to be entertained that the more processes you put a raw material through, the more valuable was the product which it ultimately yielded. In a sense of course this is true. Muddy water filtered first through gravel, and then through sand, and then through charcoal, and then through paper, is purer than muddy water filtered only through gravel. Spirits twice distilled are stronger than spirits once distilled. But water cannot be purer than perfectly pure, or spirit of wine stronger than a certain strength; so that beyond a certain number of filtrations and distillations, no end is gained by repeating them but waste of time, material, and money. This was not realised by the older workers. They could give but a vague reason for any of the steps of their processes. They dare not safely omit one or alter one, and as they no doubt produced powerful medicines in spite of their clumsy methods of preparation, they were content to walk blindfold in a tediously circuitous path of routine. They were not altogether to blame for this. Excellent medicines are prepared at the present day by processes which the chemist cannot show to be wise, and yet cannot amend. Take, for example, Battley's Sedative Liquor, or the true James's Powder, as distinguished from the antimonial powder of the Pharmacopœias. We cannot affirm that we fully understand the cause of the superiority of the two first-mentioned medicines to their imitations, and we cannot reprehend the makers who rigidly adhere to their routine rules for making them. But on the other hand, an empirical process of manufacture almost invariably includes some useless or prejudicial operation, and may as certainly be improved if deliberately studied by one who has a distinct conception of its object, and can intelligently trace the changes which are effected in the material under manufacture at each stage of the process. This, however, was not attempted by our forefathers.

Further, an empirical pharmacy could not avoid wasting much time in unconsciously producing from widely different materials the very same product, without being aware that it was the same. The vast assemblage of drugs in the old pharmacopœias shrinks into a dozen or two when tried by modern chemical analysis. Witness, for example, the endless distillation of parts of animals in the expectation that each would yield a different animal spirit, so that the horns of deers, the bones of vipers, and the skulls of executed men were supposed to afford by destructive distillation dissimilar, instead of, as is the case, practically identical products. Witness, also, crabs' eyes, oyster shells, pearls, and chalk, all appearing as different medicines, and as yielding different products. Every art must lean largely on experience, but to lean entirely on it is to make that a crutch which should be only a staff to steady and guide the steps.

The last characteristic of the ancient pharmacy I named was technicality, but I need not dilate on it. An empirical art must be technical, for all its steps, and

instruments, and processes have a supposed real or positive value, and each has a special name. But when an empirical art is also a mystical and secret one, it is certain to multiply technicalities. No one who has read old alchymical or pharmaceutical books can doubt that their authors often wilfully mystified their readers, and not choosing that they should discover all that was professed to be taught them, concealed under words of double meaning or no meaning, the significance of a statement which affected to scorn concealment. From this cause and from others, it resulted that our pharmaceutical predecessors honestly, half-honestly, and dishonestly, multiplied things and names. Their shortest recipe for the production of a medicine occupies a goodly page. What one of us would set about on a moment's notice, and effect within an hour, with a glass retort, Florence flask, and a gas jet, those who implicitly followed the directions of our predecessors would have brought to a successful conclusion only after long arrangement of furnaces larger than those that serve our locomotive engines, and after disposal of sand-baths and cucurbits, aludels, adopters, and recipients, with lutings and refrigeratories such as Faraday, hoping to solidify hydrogen, would smile at as some thousand horse-power more than he desired.

Such was British pharmacy some 200 years ago. You have asked me to address you this evening, in proof that it is something different now. And so it is. Along with all the other arts, it was changed and exalted by the teachings of Bacon, and the doings of the famous men who inaugurated the Royal Society, as a Society devoted to the study simply of natural science. Pharmacy is not now mystical. This age does not err by putting too much faith in the supernatural. Mesmerists, advocates of spirit-rapping, admirers of table-turning, and modern ghost-seers, ask our attention, not as having stormed and subjugated the spirit-world, but as having brought all the supposed spiritual manifestations under the domain of physical science. Nor is modern pharmacy very secret, but it is more secret than it should be; for none but the vulgar will now believe in the efficacy of mysterious specifics which cannot be submitted to chemical analysis; and the worthless trash which, under the title of patent medicines, are sold, not at their money value, at which let all things be sold, but at an extravagant price, dictated by cupidity, misery, and the dread of death, cast discredit on the enlightenment of our living pharmaciens, and claim from them redress.

Empiricism and needless technicality are also fast disappearing from the existing pharmacy. I will therefore only endeavour to point out two directions, in which I think my science of technology can specially profit you.

In the first place, it counsels pharmacy to have done with secrecy. Secret or patent medicines may unquestionably profit, in a money point of view, individuals who are worse than the quacks and charlatans of former days, inasmuch as they affect not to be quacks, but to recommend on purely scientific and dispassionately philanthropic grounds their worm powders, pulmonic wafers, and antibilious pills. Let us demand that all favourers of such shams shall leave our camp, on pain of being drummed out with the rogue's march in their ears to quicken their steps, and the request that they will make the motto of their flag "*Populus vult decipi, et decipiatur*"—The people love to be deceived, and let them be deceived.

Unquestionably the discoverer of a precious medicine—for example, the discoverer of chloroform as an anæsthetic—may justly take a patent for so great a gift to his brethren; and who would grudge Dr. Simpson the largest sum that ever patentee gained? With honest open patents there can be no quarrel, and so far from objecting to them, I rejoice to see that the Society of Arts in London is amending the conditions of obtaining them, so as to lessen their cost, and make them more available to patentees.

Secondly and specially, technology can best serve pharmacy by meeting it at the thousand points where it is dependent on other arts, and on many sciences. Look round an apothecary's shop! Who made the drawers? "I" (after the fashion of the respondents in *Robin Red-Breast*), said the carpenter, "I made the drawers."—Who made the bottles? "I," said the glass-maker, "I made the bottles."—Who made the ointment pots? "I," said the potter, "I made the ointment pots."—Who made the scales and weights? "I," said the brassfounder, "I made the scales and weights."—Who furnished morphia, veratria, and strychnia? "I," said the chemist, "I furnished morphia, veratria, and strychnia."—Who supplied gentian, senna, cinchona? "I," said the botanist, "I supplied gentian, senna,

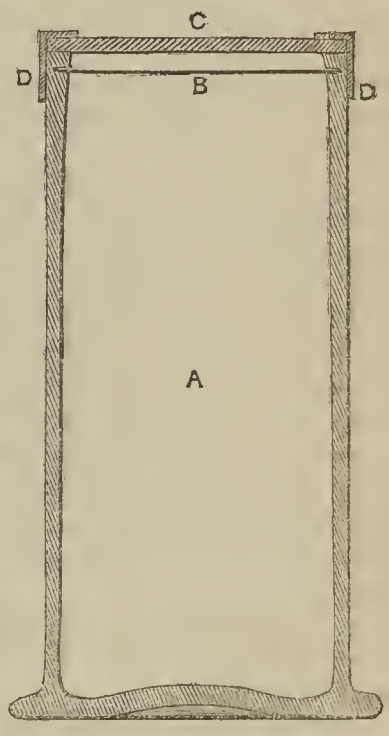
cinchona."—Who gave you alcohol? "I," said the distiller.—Who gave you glycerine? "I," said the candle-maker. In short, every art is now dependent on every other art, and the object of technology is to insist on this, and to bring all arts together.

Let me ask you, therefore, as alike givers and receivers in that republic of arts which technology represents, to encourage me in the new and strange chair which I occupy, and let me further request your assistance towards adding to the Industrial Museum, which does not seek, as it does not need, to rival your museum or any other, but nevertheless may be greatly aided by your good offices, which it will cordially strive to repay.

This communication was listened to with much attention and great applause. At the conclusion, Mr. Baildon proposed a vote of thanks to Dr. Wilson for his excellent and eloquent paper, which was carried unanimously, with acclamation. Professor Wilson replied, and gave the meeting some interesting details regarding the formation of the Industrial Museum, and solicited the assistance of Members of the Society in providing such specimens as came under their observation, and which were suited for the object contemplated in the appointment of a Chair so closely connected with industrial science.

Specimens of new Preparation Jars, invented by Mr. Peter Stevenson, were then submitted to the meeting.

DESCRIPTION OF A NEW PREPARATION JAR.



A is a vertical section, and, as here shown, the jar is made a little thicker in the glass at the mouth than is required in the body. It has two *indents*, one opposite the other, an eighth of an inch below the mouth, inside of the jar, to hold a slip of whalebone (*B*), by which the preparation may be safely and conveniently suspended. The mouth of the jar is carefully ground flat and smooth, like the receiver of an air-pump. Upon this ground surface the cover *C* rests, made of polished plate-glass, the same size as the external mouth of the jar, and firmly retained in its place by the bronzed metallic ring *D*, which slips over it, and fits the outside of the mouth of the jar. *C*, being transparent, both allows light to enter the jar vertically, and permits the preparation to be inspected from above.

Directions.—After the preparation has been properly placed in the jar, fill it up with the clear preserving liquid until it is nearly full, leaving only a small space to allow for expansion by increased temperature; then wipe clean and dry the ground surface at the mouth, and rub it slightly with lute; now put on the glass cover, previously cleaned and dried, fix it firmly down in its place with the bronzed ring, and the operation is complete.

The cylindrical jars are charged at the rate of 1*s.* 6*d.* per lb., and the oval ones at 1*s.* 8*d.* per lb., and 1*s.* additional, each jar, for the fittings.*

Thereafter a simple mode of testing for the presence of arsenic by the use of Marsh's Apparatus was exhibited in action by Mr. James Hunter.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

The usual monthly evening meeting of the Members was held in the Lecture Room, Victoria Street, on Friday, March 7th,

MR. WOOLLEY, PRESIDENT, IN THE CHAIR.

Those clauses of Mr. Headlam's Medical Bill, which more particularly refer to Chemists and Druggists, were read and discussed; the general opinion appeared to be that its provisions would not interfere with the legitimate exercise of the Phar-

* Made by Peter Stevenson, Philosophical Instrument Maker, 9, Lothian Street, Edinburgh.

maceutical calling, and that the clauses relating to the illegal practice of medicine by unqualified persons, would, if properly carried out, do much towards suppressing that host of ignorant quacks who, under various titles, now carry on their illicit practices with impunity.

Mr. Wilkinson read a paper on

POISONS,

of which the following is an abstract:—

After referring to the excitement created in this country by the recent cases of poisoning, he said that the practice of destroying life by means of poison dated from very remote antiquity, and was continued in our own times. It prevailed to a fearful extent in France and Italy during the 16th and 17th centuries, and very extraordinary stories are related by some writers respecting the modes adopted at that period for administering poison, many of which were quite incredible. Still, there is no doubt that the action of poisons on the human body had been very closely studied by the poisoners of that age, and very astonishing effects were produced. One great cause of the prevalencc of this crime has been the impunity with which it could be practised, from the great difficulty of its detection, for it is only in very recent times that the Chemist has been able to detect with certainty the presence of small quantities of poison in the human body after death. Twenty years ago even, the processes adopted were such as would fail to detect the minute traces it is now possible to do; yet all the improvements and appliances of modern Chemistry are still insufficient to detect some of the most fatal poisons, as the vegetable alkaloids, whose chemical characters (with perhaps one or two exceptions) are not sufficiently marked to be detected in the human body in the minute quantities which may cause death. With metallic poisons and prussic acid the case is very different. There the reactions are so decided, that with proper care detection is certain. The past year has shown some remarkable instances of thc detection of minute quantities of metallic poison in the human body, but I know of no case that exemplifies the accuracy and delicacy of modern analytical research, better than the analysis by Dr. Frankland, in Manchester, of the stomach and liver of Monaghan, in which he detected the presence of copper, zinc, and lead ; and at the inquest, the surgeon who attended the man, says he gave him on the 26th of July (fifteen or sixteen days before his death) a mixture containing three grains of sulphate of copper; on the 30th, a mixture containing six grains of sulphate of zinc ; and on the 2nd of August, a mixture containing eighteen grains of acetate of lead ; thus proving the accuracy of Dr. Frankland's analysis, and also showing that copper, administered fifteen days before death, has not entirely passed out of the system in that time. This I certainly think deserves to be considered one of the most striking analyses on record.

Mr. Wilkinson then concluded his lecture by showing the modes adopted, and the tests employed for the detection of prussic acid, and thc more commonly employed metallic poisons.

A conversation afterwards took place, in the course of which Dr. Gerland said that arsenic was much more widely diffused than was generally supposed. He had detected both As and Sb in the sediment from several mineral springs. He also gave an outline of the plan for detecting the adulteration of beer with cocculus indicus, and also that of picric acid, which is sometimes practised.

A vote of thanks to Mr. Wilkinson for his paper being passed, the meeting terminated.

ORIGINAL AND EXTRACTED ARTICLES.

ON HERMODACTYLS.

BY DR. J. E. PLANCHON.

Dr. J. E. Planchon, of Montpellier, has presented to the School of Pharmacy of Paris, a learned and elaborate thesis upon hermodactyls considered in a botanical and pharmaceutical point of view.* We would willingly have offered our readers a translation of this valuable and interesting contribution, but its great length would cause it to exceed the space we could devote to such a subject. We will, therefore, proceed to give an abstract of it, commencing with Dr. Planchon's introductory observations.

> The name *Hermodactyl*, a contraction of the Greek word Ἑρμοδάκτυλος which signifies *Finger of Hermes* or *of Mercury*, is the designation of certain ovoid heart-shaped cormi [*tubercules*]†, about the size of chestnuts, a little compressed, convex on the back, more or less flattened on the front, which is traversed by a broad, rather inconspicuous furrow. The surface of these cormi, which is of an ochreous colour, is generally smooth, rarely with some traces of longitudinal wrinkles: their substance is homogenous, compact, light, and easily reducible into a white powder, consisting almost entirely of starchy matter and having a sweetish taste leaving after it a very slight trace of acridity.
>
> Hermodactyls have long been celebrated in the Materia Medica as a remedy in affections of the joints, but have in recent times fallen into complete disuse. By traditional custom they are, however, sometimes still preserved in the old jars of the pharmaciens, where, deprived of activity by age, they are generally the food of insects.
>
> A substance thus condemned in modern medicine may seem but little worthy of study and research. On that point, however, science has happily higher views than the utilitarianism of the moment; she seeks truth for its own sake, assured moreover that what is useful, is the natural fruit of what is true; she cultivates erudition as justice due to the past, and as a mental exercise by no means without advantage.
>
> Our ambition will be satisfied if we can add some arguments in support of these ideas.
>
> The history of hermodactyls is beset with doubts and errors: doubts as to the identity of the substance as mentioned by different authors; and doubts as to the plant which produces the hermodactyl of the shops. Here we have a series of questions, the study of which will be the object of the first part of this memoir; the second part more especially botanical, will be devoted to the examination of the cormus of *Colchicum variegatum*, L., and the rhizome of *Hermodactylus tuberosus*, Salisb. (*Iris tuberosa*, L.).

In the first section of chap. i., on the *Hermodactylos* of the Greeks, the author gives several extracts from Alexander of Tralles, who flourished about the middle of the sixth century, and who is the earliest Greek author to mention Hermodactyl. Several of the formulæ of this old Greek physician, prescribing Hermodactyl, are preserved, and singularly minute and precise they are. Their laudatory titles too are curious, as [*Medicamentum*] *valdè bonum, experientiâ a nobis probatum; Egregium antidotum quod Theodotius philosophus exhibebat;* and another, ordering Myrrh and Hermodactyl only, called, reasonably enough, *Auxilium podagricum valdè bonum.* Paulus Ægineta, apparently the only other ancient Greek author who treats of Hermodactyl, is then reviewed.

Section 2 is devoted to the *Surugen* or *Surengian* [سورنجان *Sūringān*]

---

* *Des Hermodactes au point de vue botanique et pharmaceutique. Thèse présentée et soutenue à l'Ecole de Pharmacie de Paris, le 8 Janvier*, 1856, *par J. E. Planchon, Docteur ès Sciences et en Médecine; Professeur suppléant à la Faculté des Sciences de Montpellier.* Paris, 4to. pp. 47.

† The author employs the word *tubercule*, as synonymous with *bulbo-tuber* or *cormus*. We have rendered it by the latter term.

of the Arabs, a sort of Hermodactyl still current in the bazaars of the north of India, and the opinions and statements of Serapion the Younger, Avicenna, and Mesue are quoted at length.

In the third section, *On the Hermodactyls of the shops*, the author begins by pointing out that the form and structure of these cormi is such as to leave no doubt that they are those of some species of *Colchicum*. Referring, therefore, to the chapter on *False Hermodactyls*, plants of all other genera from which the drug has been supposed to originate, Dr. Planchon directs attention to the species of *Colchicum*, which may most likely produce the genuine Hermodactyl. After quoting Tragus, Fuchsius, Valerius Cordus, Dodonæus, &c., the author alludes to the celebrated Tournefort, who, it might have been hoped, in his travels in Asia Minor, would have thrown some light upon the question under notice. But neither his herbarium (still preserved at Paris) nor his printed works, remove any of the doubt in which the problem was left involved by his predecessors.

Dr. Planchon proceeds :—

> An English author, Samuel Dale,* is the first, to our knowledge, who named this species [*Colchicum variegatum* Cornuti] as perhaps the source of Hermodactyl. Miller, in his Gardener's Dictionary, receives this conjecture with some reserve, not venturing to pronounce between *Colchicum variegatum* and his *C. tessulatum* (*C. Bivonæ* Guss.). Fée, in 1828, adopted the idea of Dale, which, by misinterpretation, he attributed to old Matthiolus. Geiger, in 1829, and Kunze, in 1834, adopt the same opinion, though evidently with doubt. So also Pereira, who asks if Hermodactyl is not rather the produce of *C. bulbocodioides*, a question which we will treat in the chapter on *False Hermodactyls*. Lastly, M. Guibourt, after refuting various errors of his predecessors, and asserting with precision the genus to which Hermodactyl must belong, hesitates between *Colchicum variegatum* and the pretended *C. Illyricum* of Anguillara, an imaginary plant which, as we shall show, ought to be blotted out from scientific lists.
>
> This rapid *exposé* of the question is enough to show that it is still pending, and that books merely will not suffice for its solution. In default of direct observation in the country where the cormi are collected, we have sought information in herbaria and gardens.
>
> Among the numerous species of *Colchicum* contained in the rich herbaria of the Museum of Paris, of M. Delessert, of M. J. Gay, and of M. Cosson, none has appeared to us better to agree with the Hermodactyls of commerce than *Colchicum variegatum*. It is the only species of the group of colchicums having the flowers in the autumn and before the appearance of the leaves, whose dried cormi preserve a surface almost entirely smooth, that is to say, without appearance of wrinkles or longitudinal *striæ*. These *striæ* are, on the contrary, manifest in *Colchicum autumnale* L., in *C. tessulatum* Mill. (*C. Bivonæ* Guss., *C. latifolium* Fl. Græc.), *C. speciosum* Steven., *C. Kotschyi* Boiss. and *C. umbrosum* Stev., all species whose cormi might, in size, compare with Hermodactyls. We leave out of comparison that division of Colchicums in which the leaves appear at the same time as the flowers, as for instance *C. bulbocodioides*, because the cormi of these rarely exceed the dimensions of a hazel-nut, and never attain the mean size of Hermodactyls.
>
> *Colchicum variegatum* is perfectly characterised in the genus by its wavy leaves, its rosy flowers relieved with purple spots, the chequered distribution of which reminds one of *Fritillaria Meleagris*. The acuminate divisions of the perianth well distinguish it from *Colchicum tessulatum* Mill., which has flowers of an analogous colour, under which species may be placed as mere varieties, the *Colchicum Lusitanicum fritillaricum*, and the *Colchicum Neapolitanum fritillaricum* of Parkinson. The same old author in his *Paradisus*, published in London in 1629, was the first to distinguish *Colchicum variegatum* under the name of *Colchicum fritillaricum Chiense*. This handsome species was from that period cultivated in England, in common with several others of the same genus. It grows naturally in various parts of continental Greece and in the Greek islands,

* *Pharmacologia.*

as in Crete, Scio, and Cos, as well as in the neighbourhood of Smyrna in Asia Minor. We have seen no specimens from Syria or Egypt.

The cormus of this species presents, as we have said, scarcely any traces of longitudinal wrinkles,—the first and important coincidence with the officinal Hermodactyl. Other characters complete the resemblance between these two cormi seen in the same state of desiccation—shape, colour of surface and internal substance, form of starch granules, sweetish taste followed by slight acridity—all sufficiently agree to induce one to regard the two products as having the same origin. Let us be cautious, however, of offering such a conclusion as perfectly decisive. To arrive at positive certainty in the matter, we must have examples of the officinal Hermodactyl provided with their most characteristic organs (flowers, fruits, and leaves), instead of being reduced to the study of simply the denuded cormus. We must also know with certainty the country where the officinal Hermodactyls are collected, which some say is Asia Minor, others Syria or Egypt, but always without proof that such statements are well founded.

Admitting, then, with a certain reserve, that the officinal Hermodactyl is derived from *Colchicum variegatum*, the author proceeds in sects. 4 and 5 to compare its cormus with the *Hermodactylos* of the Greeks and Arabs. He sets out by explaining a difficulty that we confess has often struck us on looking at Hermodactyls, namely, by what effort of imagination could the Greeks have likened this cormus to a *finger?*

At first sight, nothing appears more difficult to imagine than that the Hermodactyl of the shops should be the *Finger of Hermes* of the Greeks. What can we find in the Hermodactyl that has the least analogy with the form of a finger which the name Ἑρμοδάκτυλος seems to suppose? Those even, who relying on tradition, recognise in the Hermodactyl of our day the *Hermodactylos* of the Greeks, have, we say, eluded rather than explained this etymological objection.

More favoured by circumstances and by recourse to the direct study of nature, we make of this objection a proof, and of this difficulty the chief key to the whole enigma. Let us, however, first state an important fact.

The cormus of *Colchicum variegatum*, probably as in other species of the same genus, is not constant in form. Sometimes it is ovoid-cordiform, at least it is as broad, or nearly so, as high, with the inferior process, on which the flower-bearing shoot rests, much shorter than the body of the cormus. Thus it has been represented by Gerarde (*Herbal*, p. 163, fig. 14), Cornuti (*Canad.*, p. 136), and afterwards by Gawler in the *Botanical Magazine* (tab. 1028). It is thus we have observed it in the examples in the Delessert Herbarium, and in the living plant cultivated in the garden of the Ecole de Médecine of Paris. Such, too, with slight variations, is the ordinary form of the Hermodactyls of commerce.

At other times, however, the cormus consists of a principal ovoid-oblong body, with an inferior, much-elongated process, which has the appearance of a nail, or, as one may say, of the terminal phalanx of a finger. This digitiform state of the cormus, is that which Parkinson must have had in view when he described in his old, quaint, language, *Colchicum variegatum* or *Colchicum fritillaricum Chiense.** Long afterwards, one finds the same form figured and described in the *Liliacées* of Redoubté (tab. 238), and finally it is that which we have here represented from a living example in the Jardin des Plantes of Paris.

If the word *Hermodactylos*, or *Finger of Hermes*, seems but little to apply to the cormi of *Colchicum variegatum* in their short and compact form, we can answer that it is a term which applies naturally enough to the same organs in their elongated, dactyloid form. In thus again drawing together the name and the thing, after an interval of centuries, there is the first sign of what will be confirmed by considerations of another nature.

Dr. Planchon here points out that the Hermodactyls now found in the shops are almost devoid of any active properties, from which, however, we can by no means infer the absence of activity when in a recent state. The process of

* *Paradis.*, p. 156.

drying, and especially age, alter the composition and weaken the medicinal powers of the Colchicums, including even our own officinal species, *C. autumnale*. Such is certainly the case with *C. variegatum*, the cormi of which, in M. Delessert's herbarium, have completely lost the acrid bitter taste, which is their characteristic in the fresh state. This, on the one hand, explains the disrepute into which Hermodactyls have fallen with us, and, on the other, the confidence with which they were looked upon by the Greek physicians, who had the drug as it were *sub manu*, and could administer it while recent. We fully agree with Dr. Planchon in thinking that these coincidences prove at least the generic identity of the plant which affords our Hermodactyl, with that which yielded the *Hermodactylos* of the Greeks.

We shall not follow our author through the section he devotes to a comparison of the *Sūringān* of the Arabian writers on medicine with the Hermodactyl of the shops, because we are convinced that the drug, as met with under the same name in the East, at the present day, is the cormus of a *Colchicum*, nearly agreeing, to say the least, with the specimens occurring in European pharmacy.

One prominent fact results from the preceding considerations: it is the probable identity of the *Hermodactylos* of the Greek physicians of the sixth and seventh centuries with our Hermodactyl, and consequently with a species of *Colchicum*, be it *C. variegatum* or some other oriental species.

It is from having contested this fact, and refused without reason the testimony of the Arabs on this question of materia medica, that the discovery of the properties of *Colchicum* in diseases of the joints has lain dormant for entire centuries.

(*To be continued.*)

ON THE SUGGESTION TO SUBSTITUTE AQUA LAURO-CERASI, &c., FOR HYDROCYANIC ACID.

BY MR. A. F. HASELDEN.

It was with some surprise that at the last Pharmaceutical monthly meeting, I heard the suggestion made that aqua lauro-cerasi, or aqua amygdalæ amaræ of a *definite* strength, might be substituted for the acidum hydrocyanicum now in use.

As far as my own, perhaps imperfect, experience goes in the matter, I am of opinion that no advantage could possibly be gained by the proposed substitution.

In looking over the forms of the Edinburgh, Dublin, and most of the foreign Pharmacopœias, I can discover, I think I may with safety say, no two in every particular alike as to strength and mode of preparation; although this might also in part be said of the hydrocyanic acid it could not as a rule be alleged with equal justice against it.

Speaking of the aqua lauro-cerasi, Dr. Christison says, "This preparation was used as an anodyne and hypnotic long before the hydrocyanic acid, its active ingredient, was discovered, and of late it has come into rather general use as a substitute for the medicinal hydrocyanic acid, because it is thought to be less apt to vary in strength. This, however, is a mistake, as any one must perceive on considering the variable proportions of oil in the leaves at different seasons, and in different leaves of one plant in the same season, or the varying proportion of hydrocyanic acid contained in different specimens of the oil, or the gradual diminution of the acid in the water, according to the length of time it has been kept."

Again, the author of the *French Universal Pharmacopœia*, after giving the different forms for preparing aqua lauro-cerasi, observes, "The age and condition of the leaves causing this preparation to vary so much, independently of the plan pursued in obtaining it, it ought to be rejected."

It would also appear that the London College, in not admitting it into the Pharmacopœia, entertained the same opinion.

Having thus far mentioned some of the objections hitherto urged against the general employment of aqua lauro-cerasi, or aqua amygdalæ amaræ, and which rest mainly upon an uncertain and undefined strength—let me venture a step further, let me imagine these difficulties entirely overcome, that for the future one mode of obtaining the cherry-laurel, or bitter almond water, should be unvaryingly pursued, and a certain definite strength fixed, of which definite strength it should be everywhere prescribed and presumed to be kept—let me now ask, Will this preparation remain fixed, unchanging, and unchanged?—will not time, light, heat, situation where kept, and a multitude of other circumstances produce any alteration, any diminution of strength?—will this water of an originally prepared definite strength continue uninfluenced by any of the above-mentioned causes more than the hitherto indefinite preparation? I think not, if prepared from the same vegetable source, at whatever standard the strength be fixed, it must, I fear, remain subject to the same objections in respect to subsequent alteration.

I would now submit for consideration another simple question, How would the profession receive the substitute? The introduction of the dilute hydrocyanic acid of the Pharmacopœia was at first a source of difficulty; some little time and practice were necessary to bear in mind the relative strength of the new acid and Scheele's, which had hitherto been generally used. After twenty years' familiarity with these forms of a valuable medicine would the revival of an almost obsolete preparation be desirable or well received?

As the matter stands at present, every one prescribing hydrocyanic acid feels that he is ordering a preparation where the greatest caution is necessary, and this care is universally observed, the dispenser is also impressed with the same idea of responsibility, the very name carries a caution with it. Would it be equally so with the cherry-laurel or bitter almond water? Would not the fact of its being a water leave it open to the risk of being ordered indiscriminately, sometimes as a vehicle like the numerous other waters, or sometimes simply for the flavour? This suggests another difficulty in fixing the dose; should it range from five to twenty minims, or from one to four drachms? Here there is certainly room for a large amount of consideration before such a point could be satisfactorily determined. One or two words upon the medicinal hydrocyanic acid now in use, and I will then leave it to abler pens either to confirm or improve upon my remarks.

It has been admitted upon good authority that hydrocyanic acid, as now prepared, is a most valuable agent; indeed, daily experience testifies to it; that it is sufficiently pure and uniform for any required practical purpose, that with ordinary care it may be preserved good for a length of time, that its strength is easily ascertained by a very simple test, and when deteriorated or spoilt, it is so inexpensive, that no one would for a moment hesitate to throw away the valueless preparation, and provide a fresh and pure supply.

18, *Conduit Street, March*, 1856.

ON THE PREPARATION OF OXYGEN.

BY MR. E. O. BROWN.

In the last number of your Journal is a communication from Mr. Witt respecting the chemical changes that take place in the formation of oxygen from chlorate of potash, originating in an inquiry from Mr. Hornsby on this subject in your February number.

Mr. Witt, in arriving at the conclusions which he there sets forth, has not, in my opinion, observed with sufficient care the curious changes which present themselves to our notice when chlorate of potash alone, or mixed with binoxide of manganese, is subjected to the action of heat. In the decomposition of chlorate of potash by heat, he considers the phenomena to be the same whether

the chlorate be used alone or mixed with binoxide of manganese, "the latter acting merely by offering a number of points of contact from which the gas is disengaged, in the same way as finely divided insoluble bodies in general promote the boiling of water."

Now, when chlorate of potash is heated alone, it first enters into perfect fusion, then, on slightly increasing the temperature it is decomposed, as Mr. Witt correctly states, into oxygen, chloride of potassium, and perchlorate of potash, the latter salt being decomposed by a further increase of temperature.

When chlorate of potash mixed with $\frac{1}{10}$ of its weight of binoxide of manganese is similarly treated, a marked difference may be observed during the decomposition of the salt. In the first place, *the chlorate does not fuse* throughout the mass. Secondly, A portion of it becomes incandescent, and a rapid disengagement of gas is produced. This incandescence, or glow, preceded by local fusion, spreads rapidly from particle to particle until the whole mass has exhibited the same phenomenon, the binoxide of manganese and chloride of potassium forming a porous residuum.

Now, I conceive that something more than the mere mechanical action of the binoxide must be advanced in order to account for the difference between these phenomena. It is stated that oxide of copper, sesquioxide of iron, and sesquioxide of chromium, answer quite as well as the binoxide of manganese, and that these substances are *chemically the same at the end as at the beginning of the operation*. This fact, however, by no means proves that the action of these bodies is simply mechanical. Mechanical action alone cannot generate heat, and it is evident that an intense temperature is produced, although the heat supplied by the lamp is certainly much below that required for the decomposition of chlorate of potash alone. The difference between a mechanical and a chemical action may be readily seen by using an equal weight ($\frac{1}{10}$ of the chlorate) of powdered quartz, instead of any metallic oxide; the chlorate will then fuse quietly, and decomposition will ensue in the same manner as with chlorate alone.

Mr. Witt also, while describing the evolution of oxygen from chlorate of potash, observes that it appears to possess remarkably energetic oxidising powers, and in order to account for this, suggests that oxygen, at the moment of its disengagement, may be peculiarly active, or that its properties may be due to the presence of ozone; and, lastly, that they may be owing to the very high temperature at which the oxygen is evolved. Mr. Witt also subsequently states in his postscript that ozone is actually present in oxygen prepared by heating chlorate of potash. This statement appeared to me so remarkable, that I was induced to try a number of experiments, thinking that it would be interesting to prove that ozone (contrary to the generally received opinion) was capable of attaining the high temperature which it must necessarily have under these circumstances, without being changed into ordinary oxygen.

The gas generated from a mixture of chlorate of potash and binoxide of manganese, was collected as usual over water, and tested with Schönbein's iodized starch paper, which immediately became blue; it was also found to possess a distinct odour of chlorine. On shaking the gas with a small quantity of distilled water, the odour, as well as its action on the paper, was sensibly diminished; the water after removal from the bottle was found to bleach a dilute solution of indigo, and to give a white precipitate with nitrate of silver. On well washing the gas with a second quantity of water, it was entirely deprived of its power of acting on iodized paper. In another experiment, the active agent was removed from the gas with the first quantity of water, sufficient pains having been taken to agitate them well together. I have never found that water from the washing of ozone produced by phosphorus has the power of bleaching indigo after its removal from the vessel, and although small quantities of chlorine and ozone have the same action on test-paper, yet the difference of their odours is too great to allow of one being mistaken for the other.

The result of my experiments appears to me undoubtedly to prove that

chlorine is evolved along with the oxygen, and that it is to small quantities of this gas that the peculiar properties of oxygen produced by this method are due, a fact which I certainly should otherwise have scarcely credited. I may also state that I conceive the white vapour (noticed by Mr. Witt) to arise from finely divided particles of chloride of potassium carried up mechanically by the violence of the action.

15, *Welbeck Street*, 20*th March*, 1856.

INTRODUCTION OF THE CULTURE OF *CINCHONA* INTO JAVA.*

There are, in various countries, certain raw products which cannot be collected —or, more properly, which *never are* collected—without the complete extirpation of the plants which afford them. The gutta-percha trees of the Indian Archipelago are a lamentable example of this; and another, even more lamentable, the cinchona forests of the South American Andes. The annihilation of the latter goes on with such giant strides, that the noble cinchona forests will, in a few years, cease to exist. The inhabitant of the Andes never thinks of future plants, and the duty recently laid by the state of Ecuador upon the exportation of the bark will not diminish the demand, and can, under the most favourable circumstances, put only a partial check on the evil. Even for the propagation of the species the needful seeds will be scarcely obtainable—perhaps, indeed, no longer so; meanwhile, there is no doubt the use of quinine will continue, as at present, on the increase. How great would be the difficulty, if the supply at last ceased !—if the poor fever-patient asked in vain for the remedy which now brings him such speedy relief—if the physician had to seek, perhaps without success, for some new agent to subdue fever !

A German *savant* has the merit of having foreseen this undesirable state of things, and of having proposed a practical method of warding off the impending evil. Professor Dr. Miquel, of Amsterdam, in the year 1846, threw out the idea of introducing the culture of the cinchona into the mountainous districts of Java, and, for the promotion of this object, presented to the Ministry of the Dutch Colonies a memorial, in which he demonstrated the possibility of such introduction, which later experiments on the island have completely confirmed. The ministry willingly took up the memorial, and consented unconditionally, according to the proposition, to send a qualified, careful person to Peru, in order to import thence into Java, by way of the Pacific Ocean, a whole ship-load of plants and seeds. M. Hasskarl was charged with the expedition; and, before one year had elapsed, arrived safely with his cargo in Java, where he found the seeds sent out by him *viâ* Holland already in luxuriant growth. Unfortunately, many plants were lost during the voyage across the Pacific, notwithstanding which there remained a sufficient number alive to secure *Cinchona Condaminea* and some other species, and at once to test the possibility of this important culture in Java.

The Dutch government (especially the minister, M. Pahud, who took up the subject warmly), Professor Miquel, and M. Hasskarl—all, in short, who have co-operated to bring about this desirable object—have just cause to be proud of the credit which accrues to them for the introduction of cinchona culture into Java, and can honestly accept the praise which will be on all sides awarded them. We heartily congratulate Professor Miquel and M. Hasskarl on the decoration of the Order of the Lion bestowed on them by the King of the Netherlands, which affords a proof that their services have met with deserved acknowledgment in the highest quarters.

It were to be wished that nations having colonial possessions had followed the example of the Dutch. The French introduced, some years since, cinchona plants in the mountain regions of Algeria; but nothing is yet announced of the result. To the English, the higher parts of the West Indies and the highlands of India offer a vast field for experiment. Professor Miquel has published, or is about to do so, a pamphlet on this new branch of cultivation, which cannot fail to direct the attention of the French and English governments to the subject, and perhaps may serve directly to secure to posterity one of the most important of remedies, and to clothe with an enviable renown the name of Miquel, as one of the benefactors of mankind.

---

* *Bonplandia*, Dec. 15th, 1855.

THE MUSK-DEER.

This little persecuted animal would probably have been left undisturbed to pass a life of peace and quietness in its native forests, but for the celebrated perfume with which nature has provided it. Its skin being worthless from its small size, the flesh alone would hold out no inducement for the villagers to hunt it while larger game was more easily procurable, and its comparative insignificance would alike have protected it from the pursuit of the European sportsman. As the musk, however, renders it to the Puharries the most valuable of all, no animal is so universally sought after in every place it is known to inhabit. Musk is in demand in nearly every part of the civilized world, yet little, I believe, is known of the nature and habits of the animal that produces it.

The musk-deer is rather more than three feet long, and stands nearly two high at the shoulder; but they vary considerably in size, those found in thick shady woods being invariably larger than those on rocky open ground. The head is small, the ears long and erect. The male has a tusk depending from each upper jaw, which, in a full-grown animal is about three inches long, the thickness of a goose-quill; sharp pointed, and curving slightly backwards. The general colour is a dark speckled brownish-grey, deepening to nearly black on the hind-quarters, where it is edged down the inside of the thighs with reddish-yellow. The throat, belly, and legs are of a lighter grey. Legs long and slender; toes long and pointed; the hind heels are long, and rest on the ground as well as the toes. The fur is composed of thick spiral hairs, not unlike miniature porcupine quills; they are very brittle, breaking with a slight pull, and so thickly set, that numbers may be pulled out without altering the outward appearance of the fur. It is white from the roots to nearly the tips, where it gradually becomes dark. The fur is much longer and thicker on the hind parts than the fore, and gives the animal the appearance of being much larger in the hind-quarters than the shoulder. The tail, which is not seen unless the fur is parted, is an inch long, and about the thickness of a thumb; in females and young animals it is covered with hair, but in adult males is quite naked, except a slight tuft at the end; and often covered, as well as all the parts near it, with a yellowish waxy substance.

The musk, which is much better known than the deer itself, is only found in adult males; the females have none, neither has any portion of their bodies the slightest odour of musk. The dung of the males smells nearly as strong as musk, but singularly enough neither in the contents of the stomach, nor bladder, nor in any other part of the body, is there any perceptible scent of musk. The pod, which is placed near the navel, and between the flesh and the skin, is composed of several layers of thin skin, in which the musk is confined, and has much the appearance of the craw or stomach of a partridge, or other small gallinaceous bird, when full of food. There is an orifice outwards through the skin, into which, by a slight pressure, the little finger will pass, but it has no connexion whatever with the body. It is probable that musk is at times discharged through this orifice, as the pod is often found not half full, and sometimes even nearly void. The musk itself is in grains, from the size of a small bullet to small shot, of irregular shape, but generally round or oblong, together with more or less in coarse powder. When fresh it is of a dark reddish-brown colour. but when taken out of the pod and kept for any length of time, becomes nearly black. In autumn and winter the grains are firm, hard, and nearly dry, but in summer they become damp and soft, probably from the green food the animals then eat. It is formed with the animal, as the pod of a young one, taken out of the womb, is plainly distinguishable, and indeed is much larger in proportion than in grown up animals. For two years the contents of the pod remain a soft milky substance, with a disagreeable smell. When it first becomes musk, there is not much more than the eighth of an ounce; as the animal grows, it increases in quantity; and in some individuals as much as two ounces are found. An ounce may be considered as the average from a full-grown animal; but as many of the deer are killed young, the pods in the market do not perhaps contain, on an

average, more than half an ounce. Though not so strong, the musk of young animals has a much pleasanter smell than that of old ones; but difference of food, climate, or situation, as far as my experience goes, does not at all affect the quality.

From the first high ridge above the plains, to the limits of forest on the snowy range, and for perhaps the whole length of the chain of the Himalayas, the musk-deer may be found upon every hill of an elevation above 8000 feet, which is clothed with forest. On the lower ranges it is comparatively a rare animal, being confined to near the summits of the highest hills, as we approach the colder forests near the snow; but it is nowhere particularly numerous; and its retired and solitary habits make it appear still more rare than it really is. Exclusively a forest animal, it inhabits all kinds of forest indiscriminately, from the oaks of the lower hills to the stunted bushes near the limits of vegetation. If we may judge from their numbers, the preference seems to be given to the birch forests, where the underwood consists chiefly of the white rhododendron and juniper.

In many respects they are not unlike hares in habits and economy. Each individual selects some particular spot for its favourite retreat, about which it remains still and at rest throughout the day, leaving it in the evening to search for food, or to wander about, returning soon after daylight. They will occasionally rest for the day in any place where they may happen to be in the morning, but in general they return to near the same spot almost every day, making forms in different quarters of their retreat a little distance from each other, and visiting them in turn. Sometimes they will lie under the same tree or bush for weeks together. They make forms in the same manner as hares, levelling with their feet a spot large enough for the purpose if the ground is too sloping. They seldom, if ever, lie in the sun, even in the coldest weather, and their forms are always made where there is something to shelter them from its rays. Towards evening they begin to move, and during the night appear to wander about a good deal, from top to bottom of the hill, or from one side to another. In the day they are seldom seen moving about. Their nocturnal rambles are apparently as much for recreation as in search of food, as they often visit regularly some steep ledge of rock or precipice, where there is little or no vegetation. The Puharries believe that they come to such places to play and dance with each other, and often set their snares along the edge of such a ledge or precipice, in preference to the forest.

If not walking leisurely and slowly along, the musk-deer always goes in bounds, all fours, leaving and alighting on the ground together. When at full speed, these bounds are sometimes astonishing for so small an animal. On a gentle slope I have seen them clear a space of more than sixty feet at a single bound, for several successive leaps, and spring over bushes of considerable height at the same time. They are very sure-footed, and although a forest animal, in travelling over rocky and precipitous ground, have perhaps no equal. Where even the burrell is obliged to move slowly and carefully, the musk-deer bounds quickly and fearlessly; and although I have often driven them on to rocks which I thought it impossible they could cross, they have invariably found a way in some direction, and I never knew an instance of one missing its footing, or falling, unless wounded.

They eat but little compared to other ruminating animals, at least one would imagine so from the small quantity found in their stomachs, the contents of which are always in such a pulpy state, that it is impossible to tell what food they prefer. I have often shot them whilst feeding, and found in the mouth or throat various kinds of shrubs and grasses, and often the long white moss that hangs so luxuriantly from the trees in the higher forests. Roots also seem to form a portion of their food, as they scratch holes in the ground, like many of the hill pheasants. The Puharries believe that the males kill and eat snakes, and feed upon the leaves of the "kedar patta," a small and very fragrant smelling laurel, and that the musk is produced by this food. They may probably eat the leaf of this laurel, amongst other shrubs, but from the few occasions upon which I have seen this laurel stripped of any portion of its leaves, it does not appear to afford a very favourite repast. Their killing snakes is doubtless quite fabulous.

The young are born either in June or July, and almost every female brings forth yearly, and often twins. These are always deposited in separate places some distance from each other, the dam herself keeping apart from both, and only visiting to give them suck. Should a young one be caught, its bleating will sometimes bring the old one to the spot, but I never knew an instance of one being seen abroad with its dam, or of two young ones being seen together. Their solitary habits are innate,

for if a fawn is taken young and suckled by a sheep or goat, it will not for some time associate with its foster-dam, but as soon as satisfied with sucking, seeks some spot for concealment. It is amusing to see them suck, all the while they keep leaping up and crossing their fore legs rapidly over each other. They are rather difficult to rear, as many, soon after they are caught, go blind and die.

In most of the hill-states the musk-deer is considered as royal property. In some, the Rajahs keep men purposely to hunt it; and in Gurwhal a fine is imposed upon any Puharrie who is known to have sold a musk pod to a stranger—the Rajah receiving them in lieu of rent.

In some districts they are hunted down with dogs, but snaring is by far the most common method practised for their capture. A few are occasionally shot by the village shikaries when in pursuit of other animals, but the matchlock is seldom taken out purposely to hunt musk-deer, for a hill shikarie does not carry the match lighted, and the deer being generally come upon face to face, almost every one would get away before he could strike a light and apply it to the match. In snaring, a fence about three feet high, composed of bushes and branches of trees, is made in the forest, generally along some ridges, and often upwards of a mile in length. Openings for the deer to pass through are left every ten or fifteen yards, and in each a strong hempen snare is placed, tied to a long stick, the thick end of which is firmly fixed in the ground, and the smaller, to which the snare is fastened, bent forwards to the opening, so that the deer, when passing through, treads upon some small sticks which hold it down, the catch is set free, the stick springs back and tightens the snare round the animal's leg. Besides the musk-deer, numbers of the forest pheasants, moonals, corklass, and argus are caught in these snares; they are visited every third or fourth day, and it is seldom that the owners return without something or other. The polecats often find out the snares, and after once tasting the feast, if not destroyed soon, become a terrible annoyance, tracing the fence almost daily from end to end, and seizing on everything caught; they are often caught themselves, but immediately bite the snare in two and escape. Musk-deer are frequently lost to the snarers in this manner, for when one is eaten by the polecats the pod is torn to pieces, and the contents scattered on the ground. No animal swallows the musk, and when a deer has been killed and eaten by a leopard or other animal, if the ground be carefully examined, much of the musk may be picked up. Insects and maggots also leave it untouched. I once found what I thought was a newly killed musk-deer, but on examination I discovered it was merely the skin and skeleton of one, which from its dry and withered state must have been dead some months; the flesh had been completely eaten away by maggots, but the musk-pod was entire.

The musk-pods which reach the market through the hands of the native hunters are generally enclosed in a portion of the skin of the animal, with the hair or fur left on it. When they have killed a musk-deer, they cut round the pod, and skin the whole of the belly. The pod comes off attached to the skin, which is then laid with its fleshy side on a flat stone previously heated in the fire, and thus dried without singeing the hair. The skin shrinks up from the heat into a small compass, and is then tied or stitched round the pod, and hung up in a dry place until quite hard. This is the general method of preparing them, but some put the pod into hot oil instead of laying it on a hot stone, but either method must deteriorate the quality of the musk, as it gets either completely baked or fried. It is best both in appearance and smell, if the pod is at once cut from the skin, and allowed to dry of itself.

The musk received from the Puharries is greatly adulterated, and pods are often made altogether counterfeit; and as they are generally sold without being cut open, it is scarcely possible to detect the imposture at the time. I have often seen pods offered for sale which were merely a piece of musk-deer skin filled with some substance, and tied up to resemble a musk-pod, with a little musk rubbed over to make it smell. These are easy to detect, from there being no navel on the skin, it being cut from any part of the body. But the musk is sometimes taken out of real pods, and its place supplied by some other substance, and these are difficult to detect even if cut open, as whatever is put in is made to resemble musk in appearance, and a little genuine added makes it smell nearly as strong. Some have only a portion of the musk taken out, and its place thus supplied; and others have all the musk left in, but something added to increase the weight. Even in the hills where it is produced, so little do the generality of the people know of musk, that I have often seen the Puharries about Gangoutrie sell to the pilgrims, to men from the lower hills, and

even to their own neighbours, small portions of what they called musk, but what was merely some substance resembling it, with a little genuine musk scattered over it. Of this stuff they would sell about a quarter of a tolah for a rupee, or about twenty shillings an ounce.

The substances commonly used for adulteration or to fill the counterfeit pods are, blood boiled, or baked on the fire, then dried, beaten to powder, kneaded into a paste, and made into grains and coarse powder to resemble genuine musk; a piece of the liver or spleen prepared in the same manner; dried gall, and a particular part of the bark of the apricot-tree, pounded and kneaded as above. The dried paste from which common oil has been extracted, called "peena," is also used, and lumps of this are often, without further preparation, thrust into a pod through the orifice in the skin, to increase the weight. Sometimes no care is taken to give the material employed in filling a counterfeit pod even the appearance of musk. A gentleman once showed me a pod he had bought from a Puharrie at Missourie; on my telling him it was counterfeit, he cut it open, and found it filled with hookah tobacco.—*Shooting in the Himalayas: a Journal of Sporting Adventures and Travel in Chinese Tartary, Ladac, Thibet, Cashmere, &c. By Col. Fred. Markham, C.B., 32nd Regiment. London: Richard Bentley, New Burlington Street.* 1854.

THE SUPPLY OF MEDICINES TO MERCHANT VESSELS.

Sir,—Having sent a letter to the Board of Trade in December last, suggesting certain alterations in the Scale of Medicines ordered by them for British Merchant Ships, I enclose you a copy of the answer I have received, as I think the information there given should be known generally. I should have forwarded it to you for the March number, but press of business prevented me.

I am, Sir, your obedient Servant,

Poplar, March 14, 1856. H. R. Peacock, M.P.S.

"*Office of Committee of Privy Council for Trade, Marine Department,*
"*8th February*, 1856.

"Sir,—With reference to your letter of the 27th of December last, suggesting certain alterations in the Scale of Medicines for British Merchant Ships, issued by this Board under the provisions of the Merchant Shipping Act, 1854, I am directed by the Lords of the Committee of Privy Council for Trade to acquaint you, that having conferred with the Director-General of the Medical Department of the Navy upon the subject, as well as with reference to other suggested amendments of the Scale, my Lords have made the following alterations, notice of which will be published in the *London Gazette*, namely, 'The Solution of the Chloride of Zinc' has been substituted for 'Burnett's Solution' in the brackets after the item 'Disinfecting Fluid;' and the 'Spirit of Nitric Ether' has been substituted for 'Nitric Ether.'

"My Lords have no intention at present of appointing Medical Inspectors.

"I am, Sir, your obedient Servant,
(Signed) "T. E. Tennent.

"Mr. H. R. Peacock, 170, *High Street, Poplar.*"

MEDICATED COD-LIVER OIL.—HORSLEY'S PATENT.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—It may be interesting to many of your readers to know that the medicated oils prepared under Mr. Horsley's patent are nothing more than imitations of some compounds of cod-liver oil, with quinine, iodide of iron, iodide of quinine, &c., devised by myself more than a year ago. Now as my claim to the invention of these remedies is unquestionably prior to Mr. Horsley's patent, I may state, without any pretensions to legal learning, that his patent is valueless, and that any person is justified in making or selling these compounds without consulting the patentee. In fact, were it otherwise, I should be prevented from manufacturing my own inventions, simply because I refrained from seeking any exclusive privileges when I had a right to do so, and another more enterprising, but with little or no claim, supplied the omission. I am, Sir, your obedient servant,

2, *Brook Street, Bond Street, March* 24, 1856. W. Bastick.

ROYAL INSTITUTION OF GREAT BRITAIN.

Friday, February 22, 1856.

SIR BENJAMIN COLLINS BRODIE, BART., D.C.L., F.R.S., VICE-PRESIDENT, IN THE CHAIR.

ON CERTAIN MAGNETIC ACTIONS AND AFFECTIONS.

BY PROF. FARADAY, D.C.L., F.R.S.

All bodies subject to magnetic induction, when placed in the ordinary magnetic field between the poles of a magnet, are affected; paramagnetic bodies tend to pass bodily from weaker to stronger places of force, and diamagnetic bodies from stronger to weaker places of force. If the bodies are elongated, then those that are paramagnetic set along the lines of force, and those that are diamagnetic across them: but if these bodies have a spherical form, are amorphous, and are perfectly free from permanent magnetic charge, they have no tendency to set in a particular direction. Nevertheless, there are bodies of both classes, which, being *crystalline*, have the power of setting when a single crystal is wrought into the form of a sphere, and these are called magne-crystals; their number is increasing continually; carbonate of lime, bismuth, tourmaline, &c., are of this nature. Bodies which being magnetic, set, because they are elongated, are greatly influenced in the force of the set by the nature of the medium surrounding them, and to such an extent that they not merely vary in their force from the maximum to nothing, but will often set axially in one medium, and equatorially in another. Yet the same bodies, if magne-crystallic and formed into spheres, though they set well in the magnetic field, will set with the *same* force whatever the change in the media about them, and are perfectly freed from the influence of the latter. Thus, if a crystal of bismuth formed into a sphere, or a vertical cylinder, has, when suspended, its magne-crystallic axis horizontal, and if the various media about it, from saturated solution of sulphate of iron, up to phosphorus, through air, water, alcohol, oil, be changed one for another, no alteration in the amount of torsion force required to displace the magne-crystal will occur, provided the force of the magnet be constant, notwithstanding that the list of media includes highly paramagnetic and diamagnetic bodies; and in such cases the measurement of the power of set is relieved from a multitude of interfering circumstances existing in other cases, and that power which is dependent upon the internal structure and condition of the substance is proved to be, at the same temperature, always the same.

A consequence of magne-crystallic structure is that the same body is more paramagnetic, or more diamagnetic in one direction than in another; and therefore it follows, that though such a crystal may have no variation in set force, produced by change of the surrounding medium, it may have a variation produced in the absolute force of attraction or repulsion; even up to the point of being attracted in one position and repelled in another, though no change in form, or in the surrounding medium, or in the force of the magnet, or in the nature of the body itself, be made, but simply a change in the *direction of the structure*. This was shown by a crystal of the red ferroprussiate of potassa, which, being coated carefully with wax, was suspended from the arm of a torsion balance so that it dipped into a solution of proto-sulphate of iron occupying the magnetic field.* When the magne-crystallic axis was parallel to the lines of force the crystal was attracted by the magnetic pole, when it was perpendicular to the lines of force the crystal was repelled; acting like a paramagnetic and a diamagnetic in turns. No magne-crystal has yet been found having such a relation to a vacuum, or to carbonic acid (its magnetic equivalent); calcareous spar is nearly coincident with such a medium, and shows different degrees of force in the two directions, but is always a little on the diamagnetic side. Calcareous spar having a trace of iron has been found very nearly up to the desired point, on the paramagnetic side; and as these preserve the full magne-crystallic relation of the two directions, there is no reason to suppose that a crystal may not be found which may not be paramagnetic in one direction, and diamagnetic in another, in respect of space as zero.

There is every reason to believe that the general magnetic relations of a magne-crystal are the same with those of the same substance in the amorphous state; and that the circumstances which influence one, influence the other to the same degree. In that case, the magnetic affections of a body might be ascertained by the examination of the magne-crystallic affections; thus the effect of heat upon bismuth, tourmaline, &c., might be examined by the set of the crystals, and with so much the greater advantage, that short globular forms could be used, perfectly free from the

* 2½ volumes of saturated solution, at 65° F., and one volume of water.

magnetic influence of the surrounding media required as temperature baths, and requiring no displacement of these media with the motion of the crystal. So crystals of bismuth, tourmaline, carbonate of iron, and other bodies, were suspended in baths of oil, water, &c., the temperature gradually raised and lowered, and the torsion force of the set for each temperature observed. With bismuth, a crystal having a force of 200 at 20° F., was reduced to a force of 70 at 300°, and the diminution of force appeared to be nearly equal in all parts of the scale for an equal number of degrees. A piece of amorphous bismuth, compressed in one direction, gave nearly the same amount and degree of change for the same alteration of temperature, leading us to the persuasion that the whole magnetic force of bismuth as a diamagnetic body would suffer like change. A crystal of tourmaline, which at 0° had a setting force of 540, when raised to 300° had a setting force of only 270: the loss of force was progressive, being greater at lower than at high temperatures; for a change from 0° to 30° caused a loss of force equal 50, whilst a change from 270° to 300° caused a loss of only 20. Carbonate of iron suffered a like change; at 0° the force was 1140, at 300° it was only 415; at the lower temperature the loss for 30° was 120 of force, at the upper it was only 34.

In all these and in many other cases, both with paramagnetic and diamagnetic bodies, the magne-crystallic differences diminished with the elevation of temperature; and therefore it may be considered probable that the actual magnetic force changed in the same direction. But on extending the results to iron, nickel, and cobalt, employing these metals as very small prisms associated with copper cubes to give them weight, it was found that another result occurred. Iron, whether at the temperature of 30° or 300°, or any intermediate degree, underwent no change of force; it remained at 300, which was the expression for the piece employed under the circumstances. We know that at higher temperatures it loses power, and that at a bright red it is almost destitute of inductive magnetic force. A piece of nickel, which at 95° had a setting power of 300, when raised to 285° had a power of only 290, so that it had lost a thirtieth part of its force; at the heat of boiling oil, it is known to lose nearly all its force, being unable then to affect a magnetic needle. Cobalt, on the other hand, requires a far higher temperature than iron to remove its magnetic character, a heat near that of melting copper being necessary. As to lower temperatures, it was found that an elevation from 70° to 300° caused an absolute *increase* of the magnetic force from 293 to 333. It is evident, therefore, that there is a certain temperature, or range of temperature above 300°, at which the magnetic force of cobalt is a maximum; and that elevation above, or depression below that temperature causes a diminution of the force. The case is probably the same for *iron;* its maximum magnetic force occurring at temperatures between 0° and 300°. If nickel is subject to the same conditions of a maximum, then that state must come on at temperatures below 0°: and it may be further remarked, that as the maximum conditions occur in the following order for ascending temperatures, nickel, iron, cobalt, such also is the same order for the temperatures at which they lose their high and distinctive magnetic place amongst metals.

ACCIDENTAL POISONING BY ACONITE.

At the assizes of Armagh, March 7, James M'Caull and Samuel Townley Connor were indicted for the manslaughter of Captain Aquila Kent, of the Lancashire militia, at Newry, on the 25th of February last. The two prisoners were young men, assistants in the shop of Mr. Connor, an apothecary at Newry, and the charge against them was, that through carelessness or ignorance in making up a prescription of Sir Henry Marsh, they had, instead of tincture of chirayita or chiretta, substituted the root of aconite, which the unfortunate gentleman had taken, and shortly afterwards expired. The following verdict was returned at the inquest before the coroner :— "That Aquila Howe Kent came to his death, on the 24th day of February, by reason of his having drunk a quantity of poisonous drug called aconite, negligently supplied to him by Samuel Townley Connor, aided and assisted by James M'Caull." The jury also recorded their opinion "that no person should be permitted to dispense or compound medicines, except those whose education and qualification enable them to distinguish between the relative properties of medicines generally." The prisoners were found guilty, and were sentenced to the mitigated punishment of four months' imprisonment.

MURDER AND SUICIDE BY CHLOROFORM.

A letter from Potsdam, of March 7, in the *Spener Gazette*, states that the surgeon-dentist Janson, who some time since quitted Kœnigsberg to establish himself in Berlin, arived March 6 with his wife and two children at an hotel of this city. At two in the afternoon, the landlord being astonished that none of his newly-arrived guests made their appearance, broke open the door in the presence of a police agent. He found Janson, with his wife and two children, all dead. The unhappy man had killed his wife and children with chloroform, and after laying them out on the bed, had sat down on the sofa and destroyed himself.—*Express*, March 13.

POISONING BY STRYCHNINE.

An inquest, extending over several days, has been held before Mr. Blackburn, at Fleischmann's Hotel, Leeds, on the body of Harriet Dove, aged 28, the wife of William Dove, residing at Burley, near Leeds. It appears from the evidence that, in December last, Mr. Morley was called in to attend the deceased, who was suffering from functional disorder of the stomach. She soon became better, and was in tolerable health on the 23rd February, when she partook of some jelly, complaining that it was very bitter; her husband, in answer to a question whether he had put anything into the jelly, replied he had only put in some of the medicine. Subsequently he told Mrs. Witham (a neighbour) that he put in only a spoonful as a joke. On Monday, the 25th, she was seized with a violent spasmodic attack. These attacks returned at intervals, with more or less violence, up to Saturday evening, March 1st, when, about eight o'clock, Mr. Dove gave her a dose of medicine; a quarter of an hour afterwards she was again seized with violent spasms, during which she shrieked out; the body being perfectly rigid and arched, resting upon the extremities, in which state she expired about twenty minutes to eleven.

It should be observed that Mr. Morley, the medical attendant, on finding the symptoms did not give way to the remedies, proposed a consultation; this, after consideration, was declined by Mr. Dove, who urgently requested that, in case of his wife's death, there should be no *post mortem* examination. He made the same request to Mr. Morley's assistant. The *post mortem* examination and the analysis were made by Mr. Morley and Mr. Nunneley, who, in their report, state that they discovered strychnine in the contents of the stomach, and traces of it in the intestines; they also express their unanimous opinion that strychnine, administered in the medicine of the deceased, more particularly in the last dose, was the cause of death. The following tests were applied: *nitric acid, acetic acid and chloride of gold*, and *sulphuric acid and bichromate of potash*—all of which gave evidence of the presence of strychnine. The body of a cat poisoned by strychnine was obtained and submitted to a parallel series of experiments, with exactly similar results.

The servant maid stated that he treated his wife with cruelty, on one occasion threatening her life, and was frequently drunk; he also frequented Mr. Morley's surgery, smoking with the pupil, and discussing the comparative merits of different poisons. On two occasions he obtained strychnine, for the purpose, as he alleged, of poisoning cats. He conversed with the surgery-boy on the same subject, expressing his opinion that strychnine could not be discovered after death. He met at a public-house Mr. Harrison, a dentist, conversed with him on Palmer's case, and asked the question, "Could you get or make any strychnine for me?" which Mr. Harrison declined. After the death of his wife, he expressed to Mr. Harrison his anxiety to know if it be possible to detect a grain or a grain and a half of strychnine after death; and finally, he retired to bed drunk, about three hours after the death of his wife.

The adjourned inquest was resumed on Monday, March 17, when an additional report of the analysis, confirming the one previously made, was presented by Mr. Morley. The Coroner then summed up; after which the jury returned a verdict of Wilful Murder against William Dove, who was committed to York Castle to await his trial at the next assizes.

USE OF THE MICROSCOPE AGAINST THIEVES.

Science threatens to leave the rogue no chance. The sun takes his portrait, and defeats his change of name and place of living. The electric wire intercepts his flight, and all but takes him in the act. Not less striking are the services of the

microscope. Prof. Ehrenberg, as our readers know, discovered the forgeries of the Uranius MS. by means of his glass; and while we are wondering at the power and beauty of the instrument, we hear of another of its triumphs. A robbery had been effected on one of the Prussian railways. A box containing money was lately lifted from a railway train in Prussia, emptied of its contents, and filled with sand. The police set to work; but the land around almost every station in the north of Prussia is sandy and the Berlin thief-catchers were at fault. Ehrenberg came into the field. He carefully examined the sand in the box; and then sent for samples of sand along the line. To the eye all the samples appeared alike; but the microscope detected slight variations in the minute vegetable life: and the station where the coin had been abstracted was soon found, and the thief in jail.—*Athenæum*, March 15.

ACTION AGAINST A BONE-SETTER.—*Staffordshire County Court.*

NORRIS *v.* CRAPPER.

The plaintiff, John Norris, a labourer of Hanford, deposed, that having had a fall and hurt his ankle, he had consulted Dr. Hallam, who said it was badly sprained, but there was no fracture or dislocation. He ordered fomentation and liniment, subsequently a bran poultice, and, three days afterwards, leeches. On the following day, Mr. Brierley (of the firm of Brierly and Crapper, bone-setters and druggists) called, and said the ankle was out. The next day Mr. Crapper called, and, by a strong manual effort, pulled the foot upward, and then right and left. He said, "There, it's gone; did you not hear it crack?" He then strapped the foot very tightly. The treatment was continued for some time, but the ankle became worse and much swollen. The patient was admitted into the infirmary, where he had been detained twelve weeks. The ankle had suppurated, and he was still in a very bad state. Dr. Hallam described the case, which he said was a strain, not a dislocation. The treatment attributed to Mr. Crapper might account for the subsequent inflammation and suppuration. Rest and fomentation would have been proper treatment. Mr. Campbell, surgeon, who had seen the case, confirmed Dr. Hallam's statement, which was also supported by Mr. Follen and Mr. Garner, medical officers of the North Staffordshire Infirmary. Some blame was attributed to the patient for walking and otherwise injuring his leg while he was ordered to be kept quiet. Mr. Crapper described his view of the case, which he stated to be a dislocation of the tibia inwards, with fracture of the fibula. After having reduced the dislocation he supplied a liniment to work away the inflammation. Several witnesses were called in confirmation of the general history of the case, and Mr. Chawner (an apothecary before 1815) appeared in support of Mr. Crapper's medical testimony. Some of Mr. Crapper's patients spoke in favour of his skill as a bone-setter. The case occupied upwards of ten hours, and the jury returned a verdict for the plaintiff, damages £20.

BOOKS RECEIVED.

The Yearly Journal of Trade, 1856, dedicated by authority to the Prince Albert. By Charles Pope. Twenty-fifth edition. London: Published at the Office, Lime Street, City.

We have had occasion to notice favourably a former edition of this useful volume. The extent and variety of the information it contains is important to all who are engaged in commerce.

On the Formation and some of the Properties of Cymidine. By the Rev. John Barlow.

The Correspondence relating to the Lancet Sanatory Commission. Examined by James Cæsar Durnford, Esq.; John A. Power, L.M., M.A., Cantab.; and Raymond S. Daniell, M.A., Oxon., with an Appendix of Documents. London: William Tegg and Co., 85, Queen Street, 1856.

On the Loss of Teeth, and the best means of Restoring them. By Thomas Howard, Surgeon-Dentist. London: Simpkin and Marshall, 1855.

Journal of the Proceedings of the Linnean Society, No. 1. London: Longman, Brown, Green, and Longmans; and Williams and Norgate, 1856.

TO CORRESPONDENTS.

Galen (Manchester).—*Protiodide of Tin.*—To a dilute solution of protochloride of tin add a very slight excess of iodide of potassium. The protiodide is deposited in yellowish-red crystalline tufts.—(Boullay.)

J. A. R. (Norwich).—(1.) The books mentioned are quite sufficient.—(2.) A pocket microscope, made by Pillischer, 88, New Bond Street, London.—(3.) *Solution of Bimeconate of Morphia.* There is no authorised formula; it is made about the same strength as Tinctura Opii.

E. E. (Weymouth), *E.* (Yarmouth), should apply by letter to the Secretary, 17, Bloomsbury Square.

S. V. R. (Hastings).—A Chemist cannot take out a licence for the sale of spirit of wine.

Inquirer (Coventry).—*Sale of Arsenic.* See vol. xi., page 41, and vol. xii., page 152.

R. A. P. S. (Holloway).—Fownes's *Manual of Chemistry.*

An Assistant (Market Drayton).—See vol. vii., No. 7. Apply by letter to the Secretary.

A Correspondent (Bath).—A saturated solution of mastic in spirit of wine.

P. S. T. (Jersey).—Attendance at the School of Pharmacy for six months, with diligent application, would probably be sufficient.

C. (Sunderland).—*Preservation of Leeches.* See page 455 of the present number.

Inquisitor (Cheltenham).—*Skeleton leaves.* See vol. xiii., page 192.

A. P. S. (Leeds).—Hardwich's *Photographic Chemistry.*

A Young Druggist (Sunderland).—The Board of Examiners (London) meet usually on the third Tuesday in each month, at 17, Bloomsbury Square. Apply by letter to the Secretary.

Mr. Thwaites (Bristol), in alluding to a note on a new kind of gun cotton in our last number, states that the same process was published by Mr. Coathorpe of that city in the *Year-Book of Facts for* 1848.

J. J. N. (Ipswich).—*Oleum Morrhuæ cum Quinâ.* We have found no difficulty in dissolving the quina, if the process alluded to page 239 of the present volume be adopted, but have found that, after standing for some time, the mixture becomes turbid, and part of the quina is precipitated.

A Member suggests that a full report of Palmer's trial would be desirable in this Journal. Our space would not admit of it, except the chemical evidence, which we intend to notice.

Communications have been received from *Mr. Ashton*, *A Medical Student* (Ireland), *R. A.* (Bath), *W. C.* (Sheffield), *Mr. Penney* (Poole), *Mr. Mackay* (Edinburgh).

We have received from *Mr. Kendall* (Stratford-on-Avon) some remarks on the Diluted Acids of the Pharmacopœias, which, having reference to the discussion on the subject at the last Pharmaceutical Meeting, will be read at the meeting on the 2nd of April.

M. R. P. S. (Staffordshire).—Messrs. Crapper and Brierley are not Pharmaceutical Chemists, or members of the Pharmaceutical Society.

Merlin (Haverfordwest).—We are not acquainted with the syrup of sarsaparilla, said to be used by a soda-water manufacturer in Montreal.

F. H. F. (Torquay).—*Selecta e Prescriptis* is published by Churchill.

Errata.—In our last Number, p. 416, line 29, *for* pended, *read* ponded; same page, line 36, *for* 56°, *read* 51°; p. 419, *for* plurias, *read* pluvias.—The sentence concluding the remarks under "Hygrometrical Results," should have been printed under "Temperature."

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XV.—No. XI.—MAY 1st, 1856.

MEDICAL LEGISLATION.

In the brief notice of the Medical Bill for session 1856 (in our March number) we confined our remarks to the general purposes and tendency of the Bill. The machinery by which its provisions were to be carried out did not present any features requiring comment in this Journal, especially at that early stage, and with the experience of many years as to the fate of previous measures.

Whether the members of the medical profession had arrived at the conviction that the introduction of a Medical Bill is a mere matter of form, or whether they were lying in ambush and waiting for a convenient moment for an assault, we know not, but from current report—positive and negative—it was supposed that the Bill was generally considered sufficiently harmless to pass with some trifling amendment. But by the time of going into committee on the Bill (April 2nd) the profession had opened its eyes, the Parliamentary representatives of the various medical and non-medical bodies were awake, the Government had been served with a "caveat," and the notice paper contained about eighty amendments. Some of these affected the principle of the Bill, others related to matters of detail, but on the motion for going into committee, Lord Robert Grosvenor commenced the attack, urging a postponement on the ground that some of the amendments affected the principle of the Bill. Mr. Barrow supported this proposal, because one amendment supported by the Government substituted for the representative principle a system of nomination in reference to the Medical Council.

Mr. Walter objected to a penal clause proposed by Mr. Brady for inflicting a penalty of £5 on all unregistered persons for practising.

Dr. Mitchell was opposed to the Bill in its original form, because he said it would throw open the profession, and convert all Chemists and Druggists into Apothecaries.

Sir George Grey explained the cause of the tardy notice of his amendments, and stated that the time for interviews with deputations had been fixed at their desire, and he had therefore only just become acquainted with the views of the profession. He suggested that all the questions at issue might conveniently be discussed in committee.

Mr. Walpole said that as the House had passed the second reading under the idea that the profession were in favour of the Bill, it would be better—having discovered the error—to refer the subject to a select committee. Lord Ebrington supported this view. Mr. Crauford opposed the postponement. Mr. Henley was favourable to it. Mr. Headlam said the Bill had been extensively circulated in the profession during the recess, and official documents received from various medical bodies were sufficient to justify a belief that it was approved. He believed the differences of opinion related to details which could be adjusted in committee. He considered postponement almost equivalent to rejection. Lord Elcho did not think so. Mr. Brady explained his views, and offered to withdraw his amendment if its retention should endanger the Bill. Mr. Black spoke in favour of a select committee.

Mr. Barrow said, neither the House nor the public had had time to consider the numerous amendments. He commented on the representative principle of the Bill.—Sir G. Grey said he had yesterday seen the representatives of several of the Colleges, who did not approve of the provisions of the Bill; and he was prepared to go into committee, and explain the grounds of his amendment.—Mr. Duncombe said he should vote for referring the Bill to a select committee, with

a view of getting rid of it. The public were the parties who ought to be consulted, not the medical bodies. It was not fair to tell the public they should only be doctored in a particular way; they should be free agents. The Vaccination Bill was another attempt at dictation, which he hoped would not be carried.—Sir J. Pakington said the motion before the House was whether the Bill should be postponed for a week. He thought this was getting rid of it by a side wind. As the Home Secretary had proposed important amendments, he thought the author of the Bill entitled to call on the Government to take charge of it.—The motion for postponement was carried by a majority of 116 to 81.

Mr. Headlam wished to come to some understanding with the Government, who had first encouraged him to proceed, and then thrown him over.—Sir George Grey explained the grounds of his having declined (in consequence of past experience) to take charge of the Bill; and on being informed that it was popular, and free from the objections in former bills, he had agreed to the introduction of it by the Member for Newcastle. Obstacles and objections having subsequently arisen, he declined to take charge of the Bill, or to bring in a Bill this session on the subject.—After some further discussion, in the course of which Lord Elcho gave notice of a Medical Bill, it was agreed that the committee on the Bill should be adjourned till next Wednesday.

April 10th.—A further discussion of a conflicting nature occurred, and was interrupted by the adjournment of the House.

The *Times*, in allusion to this subject, observes truly, "The House of Commons in Committee on Mr. Headlam's Medical Bill yesterday, was like an army in an enchanted forest—lost, bewildered, helpless. It knew not which way to turn, and at every turn there seemed to be a host of adversaries." In reference to the proposed restriction on unlicensed persons, the article winds up as follows:—"As lawyers have a licence over our property, and the clergy over our souls, Mr. Brady wished his profession to have an exclusive licence over our bodies, so that no one out of the fraternity should have a right to administer a single dose, or so much as feel a man's pulse. Happily there is no danger of such a monopoly being established. The mere mention of the proposed clause was sufficient to send it, and the Bill it belonged to, far on its way to that safe limbo—a select committee."

To the tender mercies of the select committee the Bill must now be left, with any other Bills that may be conceived or produced during the present session. In giving the above very brief outline of the proceedings on this subject, we have only to express regret at the difficulties which appear to attend it. As the discussion in the House touched upon several points which have been before our readers, it seemed proper to allude to it on the present occasion, but unfortunately the symptoms do not afford grounds for anticipating a speedy settlement of the questions at issue.

Our attention has been directed to the following article in the *Examiner*, which contains much sound sense, with some originality in the mode of dealing with the subject.

THE MEDICAL BILL.

The Medical Bill and the medical question generally is one on which experience would teach, if people would be taught.

The great soul question took three hundred years to settle; the little body question might be settled in thirty years, if the decisions in the former question were studied.

Time was when the State believed, as honestly as ever it believed anything, that it *might*, *could*, and *should* find out true doctrine for the poor ignorant community; to which, like a worthy honest State, it added *would*. Accordingly, by the assistance of a Church, which undertook the physic, the surgery, and the pharmacy of sound doctrine all by itself, it sent forth its legally qualified teachers into every parish, and woe to the man who called in any other. They burnt that man, they whipped him, they imprisoned him, they did everything but what was Christian to him, all for his soul's health and the amendment of his excesses.

But men would not submit. To the argument that the State was a father to the ignorant, they replied that it was at best the ignorant father of an ignorant son, and that a blind man could find his way into a ditch without another blind man to help him. And when the State said: But here we have the Church, which knows all about it, the ignorant community declared that it had a right to judge that question, and that it would judge it. It also said that the Church was never one thing long, and that it progressed, on the whole, rather more slowly than the ignorant community.

The end of it was, in this country, that every one who chose taught all who chose to let him teach, on condition only of an open and true registration. The State was allowed to patronize one particular Church, so that no one need trouble himself to choose a pastor from the mere necessity of choosing. But every church is allowed its colleges, its studies, its diplomas; and every man is allowed his choice. There is no proof that our souls are worse off than in the sixteenth century; and judging by fruits, there is much reason to hope they are better off.

Now the little body question is a perfect parallel to the great soul question in all its circumstances. The only things in which the parallel fails are the following:— Every one who believes in a future state sees that the soul question is incomparably more important than the body question, and every one can try the body question by experiment to a larger extent than the soul question. The proverb which always has a spark of truth at the bottom says that every man of forty is either a fool or a physician, but did even the proverb maker ever dare to say that every man is at any age either a fool or a fit teacher of religion?

Common sense points out the following settlement of the medical question, and to this it will come sooner or later:—

Let every man who chooses—subject to one common law of manslaughter for all the *crass* cases—doctor the bodies of all who choose to trust him, and recover payment according to agreement in the courts of law. Provided always that every person practising should be registered at a moderate fee in a register to be published every six months.

Let the register give the name, address, and asserted qualification of each candidate—as licentiate, or doctor, or what not, of this or that college, hall, university, &c., home or foreign. Let it be competent to any man to describe himself as qualified by study in public schools without a diploma, or by private study, or even by intuition or divine inspiration, if he pleases. But whatever he holds his qualification to be, that let him declare. Let all qualification which of its own nature admits of proof be proved, as by the diploma or certificate, &c., leaving things which cannot be proved, as asserted private study, intuition, inspiration, &c., to work their own way.

Let it be highly penal to assert to the patient any qualification which is not in the register, and let the register be sold very cheap. Let the registrar give each registered practitioner a copy of the register in his own case; let any patient have power to demand a right of this copy; and let no money for attendance be recoverable in any case in which there has been false representation.

Let any party in any suit have a right to produce what medical testimony he pleases. Let the medical witness produce his register, and let his evidence be for the jury, as is that of an engineer or a practitioner of any art which is not attested by diplomas.

Let any man who practises without venturing to put his name on the register be liable to fine and imprisonment.

The consequence would be that, as now, anybody who pleases might practise; for the medical world is well aware that there is no power of preventing what they call quacks from practising. But very different from what is now, every man who practises would be obliged to tell the whole world what his claim is, and would run a great risk if he dared to tell his patient in private anything different from what he had told the whole world.

The consequence would be that a real education in anatomy, physiology, chemistry, surgery, and what is known of the thing called medicine, would acquire more importance than it now has.

It is curious to see how completely the medical man of the nineteenth century squares with the priest of the sixteenth century. The clergy of all sects are now better divines and better men than they ever were. They have lost Bacon's reproach that they took a smaller measure of things than any other educated men;

and the physicians are now in this particular the rear-guard of the learned world; though it may be true that the rear in our day is further on in the march than the van of Bacon's day. Nor will they ever recover the lost position until medicine is as free as religion.

To this it must come. To this the public, which will decide for itself, has determined it shall come. To this the public has, in fact, brought it, but on a plan which it is not desirable to make permanent. We will be as free to take care of our bodies as of our souls and of our goods. This is the profession of all who sign as I do, and the practice of most of those who would not like the name.—(HETEROPATH.)

ANNOYANCE JURIES.

THE term Annoyance Jury is very correct and descriptive. To those who designedly levy a tax upon their customers by using short weights, and to those whose weights have become incorrect from accident or wear and tear, but who have no fraudulent intention, it is equally an annoyance to be publicly exposed and punished. Nor is it less annoying to honest and respectable tradesmen, who have taken every precaution for insuring accuracy in their weights, to be charged with some illegal act of which they are not conscious, and fined without clearly understanding the nature of the offence with which they are charged.

The domiciliary visits of men invested with a brief authority, and empowered to search for weights, and to examine and publicly destroy them at their discretion, may be regarded as an approximation to inquisitorial tyranny. We are told on high authority that "rulers are not a terror to good works, but to the evil;" and on the hypothesis that *law* and *justice* are synonymous terms, those who do right have nothing to fear. But when we consider the responsibility of carrying the law into effect—the judgment, experience, and impartiality which ought to be exercised in the performance of this duty—we may fairly question whether the mode of selection, the qualifications, and the ephemeral authority of the persons who constitute the annoyance jury, are such as to fulfil the conditions stated in the hypothesis.

The mode in which the individuals composing the annoyance jury are chosen, varies in different localities. Where no special powers exist under Act of Parliament, the duty of visiting shops is performed by a Government Inspector. In some places the Vestry or Municipal Corporation is empowered to appoint an annoyance jury, and the mode of selection depends on the will and pleasure of the Board for the time being. It may be by pricking a jury-list, and appointing the persons whose names are pricked; or by entrusting subordinate officers to select such persons as they recommend, whose names are put to the vote *pro formâ*, and carried; or by any other mode of election.

A number of chemists, residing in the city of Westminster, have lately been fined for using grain weights not stamped with the Westminster stamp. The penalty for the first offence being only 2*s.* 6*d.*, it was in most cases paid without demur, as being scarcely worth the trouble of resistance, and on the principle adopted by many persons, that it is cheaper to submit to injustice than to incur the expense of a legal defence.

The annoyance having become general in the locality, and the precise nature of the law not being understood, the penalty was resisted in the following case, for the purpose of obtaining a settlement of the doubtful point in the law affecting such cases. We hoped by this time to have been able to report the result, but this not being the case, we postpone any further remarks on the legal question until the decision of the Court is known. We have before us three Acts of Parliament relating to weights and measures, viz., the 5th Geo. IV., cap. 74, "An Act for ascertaining and establishing Uniformity of Weights and Measures" [17 June, 1824]; the 5th and 6th William IV., cap. 63, "An Act to repeal an Act of the 4th and 5th Year of his present Majesty, relating to Weights and Measures, and to make other Provisions instead thereof [9th

Sept., 1835]; 6th Vict., cap. 29, "An Act for regulating the Weights used in Sales of Bullion" [14th June, 1853].

We hope next month to be able, with the decision of the Court of Westminster, to give some explanation of the exact state of the law on the subject.

ILLEGAL WEIGHTS.

Guildhall, Westminster.

At a Court of Burgesses, convened by the Duke of Buccleuch, High Steward of the Guildhall, Westminster, held April 3rd, John Bell and Company appealed against a summons to show cause why a penalty of 2*s.* 6*d.* should not be levied against them for having in their possession weights below six grains not stamped with the Westminster stamp.

Mr. Bell said he appealed to the Court on behalf of himself and other Chemists, some of whom had previously been fined and others threatened by the Annoyance Jury for the same alleged offence. He requested to be informed under what Act and what clause in the Act the charge was brought. The Act which he had been referred to being entitled "An Act for regulating the Weights used in Sales of Bullion," he desired to be informed how the provisions of the law could be made applicable to grain weights used for dispensing prescriptions. Chemists being under the jurisdiction of the College of Physicians in regard to weights and measures, he pleaded exemption from the liability under which he had been summoned.

The High Bailiff of Westminster read part of a section of the Act to which he referred defendants, to the effect that any person using any weight or measure other than those authorized by the Act, or "not so stamped as aforesaid, or which shall be found light or otherwise unjust," shall, on conviction, forfeit a sum not exceeding five pounds.

Defendant requested to be referred to the provision by which the term "unjust" or "illegal" was made applicable to the weights used by Chemists for dispensing medicines. A Burgess said it was for defendants to prove that they had not violated the law. Defendant respectfully claimed the privilege of knowing the precise terms of the law under which the charge was brought, and by what section of the Act the grain weights used by Chemists for dispensing medicines were brought under the provisions of the law relating to the sale of bullion, diamonds, and precious stones.

The High Bailiff said the provisions of the law were general, and applied to all persons using weights in Westminster.

One of the annoyance jury stated that the maker of the weights in this case was Mr. Young, who had a very good connexion, but whose weights had in several other cases been found not stamped with the Westminster mark.

Mr. Young protested against this personal attack, and said the weights in question had been from time immemorial supplied to chemists for dispensing without the stamp, and he had always understood that they were not liable under the Act, being used for analysis or dispensing medicines.

In reply to a question, a juror stated that the weights were quite correct, but the ground of the charge was the absence of the stamp.

Defendant produced sets of weights, from six grains down to a minute fraction of a grain, and asked how it would be possible to stamp all those weights; and if some were exempt, on account of their minute size, he desired to know where the line was drawn between those which must be stamped, and those which need not be stamped. He had not been able to discover any provision in any Act of Parliament which solved this difficulty, and having taken every precaution to insure accuracy by employing a respectable scale-maker, and having all his weights periodically examined, he claimed the indulgence of the Court. He stated that his chief object in appealing was to ascertain the exact state of the law, and thus to protect other chemists from the annoyance of similar charges.

The Court did not give a precise answer to the question, but intimated that the case should be reconsidered.

One of the annoyance jury interposed, observing that several chemists had already been summoned, and paid the fine.

The Court—That is of no consequence. The fines can be returned if the decision should be in favour of the defendants.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

LIST OF MEMBERS, ASSOCIATES, AND APPRENTICES (*continued*).

MEMBERS.

London	Francis, George Baggett
	Watts, Henry Thomas
Norwich	Searby, William Martin

MAJOR EXAMINATIONS.

Bailey, Richard	Salisbury
Cross, William	Bristol
Gissing, Thomas W.	Ipswich
Halliday, William J.	Pontefract
Howell, Thomas	Haverfordwest
Lloyd, Henry	Richmond
Tyrrell, John Walter	Norwich

MINOR EXAMINATIONS.

Arnold, Spencer	Maidstone
Calvert, John	Durham
Green, John	Oundle
Groves, Henry	Weymouth
Hayes, James	Tunbridge Wells
Houghton, William	Warrington
Roberts, Owen	Pwllheli
Stewart, James	Kirkaldy
West, Robert G.	Liverpool
Williams, Thomas	Carmarthen

REGISTERED APPRENTICES.

NAMES.	RESIDING WITH	TOWNS.
Bate, Henry	Mr. Davies	Chester
Ereaut, John	Mr. Ereaut	Jersey
Fleetwood, Thomas	Mr. Kendall	Stratford-on-Avon
Hill, William	Mr. Gardner	Edinburgh
Hughes, Evan	Mr. Deane	Clapham
Iverach, John G.	Mr. Iverach	Kirkwall
Twinberrow, James K...	Mr. Twinberrow	London
White, James W.	Mr. Iverach	Kirkwall

PHARMACEUTICAL MEETING,

Wednesday, April 2nd, 1856,

MR. T. N. R. MORSON IN THE CHAIR.

The following donations to the Library and Museum were announced:—

Journal of the Society of Arts, from the Society.
Journal of the Photographic Society, from the Society.
The Literary Gazette, from the Publishers.
Thomson's *Chemistry*, 4 vols., from Mr. Burgoyne.
A Musk-pod (which, as imported, was found to be filled with pieces of leather), from Mr. Burgoyne.
Specimens of Pure Oxide of Zinc, prepared by combustion, from Mr. Hubbuck.

The following communications were made:—

ON PURE OXIDE OF ZINC FOR USE IN MEDICINE.

Mr. Redwood wished to direct the attention of the meeting to the very beautiful specimen of oxide of zinc on the table, which had been presented by

the manufacturer, Mr. Hubbuck. Some of this oxide had been submitted to him for chemical examination, and finding it to be remarkably pure, and to possess in a high degree all the chemical and physical qualities required in oxide of zinc, intended for use in medicine, he had suggested to Mr. Hubbuck that it should be brought under the notice of the Society. He (Mr. R.) had on several previous occasions adverted to the subject of oxide of zinc in that room, and he thought the present a suitable occasion for reviewing what had already been done in reference to this subject, and of pointing out what still remained to be accomplished.

In the London Pharmacopœia of 1809 oxide of zinc was directed to be made by igniting the metal in a heated crucible and collecting the product of combustion in the form of a white, light powder, which was deposited in the upper part of the crucible, over the burning metal. In conducting the process in this way it was found very difficult to obtain the oxide unmixed with particles of metal, which rendered the powder gritty, and proved very objectionable when it was applied to the skin in the form of ointment.

This difficulty seemed to have led to the adoption, in subsequent Pharmacopœias, of the process of precipitation instead of that of combustion. In the London Pharmacopœia of 1824, oxide of zinc was directed to be made by adding solution of ammonia to a solution of sulphate of zinc. The product obtained by that process, which was a white, light, and perfectly smooth powder, was not pure oxide, but a basic sulphate of zinc, consisting of—

Oxide of zinc	64 parts.
Sulphuric acid.....	13 "
Water	23 "
	100

The late Mr. Richard Phillips, in his translation of the Pharmacopœia of 1824, criticised the process there given, and recommended the substitution of carbonate of potash for solution of ammonia, the effect of which substitution was that a basic carbonate was obtained instead of the basic sulphate. This basic carbonate was also a white, light, and perfectly smooth powder, the composition of which was—

Oxide of zinc	67 parts
Carbonic acid	18 "
Water	15 "
	100

It appeared that Mr. Phillips's suggestion was very generally acted upon by manufacturers, who adopted his process in preference to that of the Pharmacopœia.

In the Pharmacopœia of 1836 the process was again changed. The basic sulphate was discarded, and a pure oxide was directed to be made by exposing the carbonate to a red heat until the carbonic acid and water were entirely expelled. The product of this process, although unobjectionable in regard to purity, was deficient in one of the characters which had previously been always associated with oxide of zinc. It did not possess the perfect whiteness which had until then always characterised the preparations bearing that name. Druggists, and even medical men, had become so habituated to white oxide of zinc, that the buff-coloured oxide of the new Pharmacopœia was looked upon as an impure article, and was generally rejected on this account.

When he (Mr. R.) first brought the subject of oxide of zinc before the Society in 1843, nearly all the oxide of zinc of commerce consisted either of basic sulphate or of basic carbonate of zinc, that was to say, it was either made by the process given in the Pharmacopœia of 1824, or by the process recommended by Mr. Phillips, the translator of the Pharmacopœia. He (Mr. R.) had pointed out the fact that such preparations differed essentially from what

was then ordered under the name of oxide of zinc by the College of Physicians, and he strongly urged the impropriety of using in medicine any other than the true oxide of zinc of the Pharmacopœia. Although the subject had been adverted to from time to time during the last twelve years, yet the adoption of true oxide of zinc in preference to its impure substitutes had not yet become general among Druggists. The reasons assigned for this were, that there was a strong prejudice in favour of white oxide of zinc, and that the price of the buff-coloured oxide of zinc of the Pharmacopœia was higher than that of the white, but impure oxide of commerce.

In speaking on this subject on former occasions, he had endeavoured to combat the prejudice with regard to colour, by demonstrating the comparative purity of the buff-coloured oxide made according to the Pharmacopœia, and the impurity of all the other varieties of oxide of zinc then met with in commerce; in fact, he had gone so far, on one occasion, as to give the character of whiteness in oxide of zinc as an indication of impurity, for at that time there was no white oxide of zinc supplied for use in medicine that was not impure. But all the efforts that were thus made proved insufficient to cause a complete or general substitution of the pure, but coloured oxide, for the impure, but white, preparation which all those engaged in its use and commerce had been accustomed to.

In now again adverting to the subject he thought he had the means of meeting every objection and even prejudice which had hitherto operated unfavourably to the general use of pure oxide of zinc, when required for medicinal purposes. The specimen of oxide of zinc on the table was not only free from all the impurities to which reference had been made, but it possessed the other qualities required by those who used it. It was a perfectly white, light, and smooth powder. This oxide was part of that produced by combustion upon a very large scale for the manufacture of zinc paint. A portion of the product was collected at one period of the process when it was yielded in a state of great purity, and the manufacturer proposed to set this apart for use in medicine. He believed also that it could be sold at such a price as would put it in competition in this respect with the less pure preparations. Mr. Hubbuck, the manufacturer, was present, and would, no doubt, be happy to give any further information on the subject that might be required.

Mr. Hubbuck stated that the oxide of zinc which the firm he belonged to proposed making for use in medicine would be free from the impurities commonly occurring in the oxide made by combustion. The zinc was first thoroughly refined, and all the lead, arsenic, cadmium, iron, and other impurity removed. The pure oxide was then produced by combustion, abstracting only the very finest part of the product for medicinal purposes. About one-tenth or one-twelfth of the whole was thus set apart in producing that from which the sample exhibited had been taken; but it was intended to take out a still smaller portion, and this could be done with advantage to the quality of the oxide, and without augmenting the cost, since their usual operations requiring the manufacturers to make several tons of oxide every day, they could separate as much as was required in a state of absolute purity, while the remainder would be equally valuable as a pigment.

Mr. Waugh inquired if this oxide of zinc had been tested with reference to its medicinal efficacy. He felt some doubt whether it ought to be substituted for the oxide of zinc of the Pharmacopœia until it was proved to be the same in its medicinal action.

Mr. Redwood said, although the processes for producing this oxide and that of the Pharmacopœia were different, yet the products were chemically the same, and it was stated in the preface to the last London Pharmacopœia that other processes than those given by the College might be adopted if the products were the same. With reference to the medicinal action of oxide of zinc made by combustion, it should be recollected that that was the original method of

preparing oxide of zinc, and that whatever reputation this remedy possessed, had been acquired by the oxide so prepared.

Mr. Bell said that several years ago the late Mr. Midgley had directed the attention of the Society to the preparation of oxide of zinc by combustion, and had exhibited at one of their meetings an apparatus which he had contrived for the purpose, but he believed the price at which it was produced, and also the presence of particles of unoxidized zinc in it, prevented the general use of the preparation at that time.

The Chairman thought the mechanical condition of substances used in medicine was often a matter of considerable importance, and ought to be considered as well as their chemical composition. He thought the specimen before the meeting was a very perfect one in every respect, and he had no doubt it was the sort of oxide of zinc best adapted for use in medicine.

Mr. Jacob Bell said the subject before the meeting, having reference to the purity or otherwise of drugs and chemicals, he took the opportunity of alluding to adulteration generally. He had that day been examined before Mr. Scholefield's Parliamentary Committee, and had previously refreshed his memory by looking over the Transactions of the Society from its commencement. It was satisfactory to observe a regular and steady progress in the object for which the Society had been established, which was to bring about that reformation in the quality of medicines which was also the purpose of the parliamentary inquiry. The Society proposed to attain this end chiefly by the introduction of a regular education for those who deal in and compound medicines, by raising their character, giving them a professional status, and thus effecting an improvement in the mode of conducting the business. In looking over the Transactions of the Society, he found in almost every number some evidence of the efforts which they had been making to attain this desirable result. It was well known that a great advance had taken place, although some persons had made sweeping charges against the Chemists as a body, which were calculated to deceive and alarm the public. These imputations had naturally annoyed those who had been striving for years against the stream to bring about an improvement, not only in the quality of medicines, but also in the qualifications of Pharmaceutists. It was time that the Members of the Society should repudiate these charges, and declare themselves promoters of reform both in education and in the matters specially referred to by the Parliamentary Committee. Their chief accusers had abstained from mentioning the efforts they had been making during the last fifteen years, and the objects and tendency of the Society had scarcely been noticed. He had, however, taken upon himself to supply the omission, and had stated on behalf of the Members of the Society that any assistance in their power would be gladly afforded in devising some means of exposing and checking the frauds which had been the subject of so much animadversion. He was sure that all present, and the Members generally, would endorse this promise, as every honest man was injured by the prevalence of adulteration; and the exaggerated statements which had been published (for what purpose it was needless to inquire) were calculated to bring them all into unmerited disgrace. The best and most practical answer to the calumnies referred to would be an appeal to the facts recorded in the Transactions of the Society from the time of its formation, and the public avowal of a determination to persevere in the course which they had hitherto pursued with a satisfactory result. No human efforts would ever put a stop to fraud and adulteration altogether, but he was persuaded that the Members of the Society had it in their power to check the prevalence of the evil. More practical advantage would result from improved education and the endeavour of the Society to raise the character of the business, than by any penal enactments that the Parliamentary Committee could initiate. At the same time it was probable that some legislation might be advantageous, and on this subject the Society ought to be consulted.

ON THE DILUTED ACIDS AND ALKALIES OF THE PHARMACOPŒIAS.

BY MR. FREDERIC KENDALL.

May I be allowed to say a few words on the subject of the conversation at the meeting of February 5th, reported in the last Journal, on the Diluted Acids and Alkalies of the Pharmacopœia?

It appears to me that at that meeting too much stress was laid upon the necessity of having absolute uniformity in the preparations of these solutions, that is, that whichever of the proposed systems might be adopted, all the solutions should consist either of the equivalent of the anhydrous substance with a definite quantity of water, and so have equal volumetrical neutralizing power, or of $\frac{1}{10}$ of the anhydrous substance and $\frac{9}{10}$ water.

I was not surprised, that under a strong impression of the necessity of this uniformity, the difficulties to be surmounted should appear great, nor that Mr. Giles should come to the conclusion (page 409) that "the endeavour to bring the acid and alkaline solutions of the Pharmacopœia to an equal volumetrical standard is impracticable."

I should be sorry, because we cannot attain the perfection that we may desire, to give up a valuable principle which is calculated not only to improve the scientific character of the Pharmacopœia, but what is of more importance, to ensure the accuracy and precision of the preparations themselves, and to facilitate detection of any deviation from the proper standard.

I do not see why that principle should be given up. It has been my practice for several years to keep for purposes of research solutions of acids and alkalies and their salts, in the proportion of the equivalent, or a fraction of it, in grains, in 700 grs $=\frac{1}{100}$ of a gallon of water. By this means I am often enabled to get approximate quantitative results with very little trouble. In the case of acids, of course they are often wanted much stronger; in that case I use two, three, or four equivalents in the same bulk of water, and in solutions of salts not very soluble I use less than an equivalent, say $\frac{1}{2}$ or $\frac{1}{4}$, and provided the relationship to the equivalent be of this simple nature, the breaking up of the latter does not in the least detract from the usefulness of the plan or from its scientific precision.

I would suggest, therefore, for consideration, the adoption of the same system in the dilute acids and alkalies of the Pharmacopœia, by which means even the intractable liq. potassæ may be brought into harmony with the rest.

In discussing the nature of any arrangement to be made for the improvement of the Pharmacopœia, it appears to me that the first and most important consideration is, that there should be as little tampering as possible with the established strength of the preparations, and consequently of the doses. There is scarcely any conceivable advantage that would make up for the confusion and the mischief which would be caused by breaking up in the mind of the prescriber the old standards of association, respecting the strength and dose of a large number of substances.

The point to be considered next in importance in this class of preparations, I conceive to be the adoption of an uniform principle of dilution, or such a simple relationship to it as shall insure correctness and uniformity of preparation, with ready means of verifying it, and, lastly, that the plan shall be in accordance with the precision and accuracy of modern science.

I believe these results may be obtained by either of the two plans I have named, with the modifications I propose. I subjoin a table of the solutions o acids and alkalies, showing the present state of dilution in reference to one part of anhydrous substance, and also to the equivalent, compared with the same substances in the proposed states of dilution.

	Proportion of anhydrous substance to water.	Proportion of equivalent to water.
Acid. Hydrochlor. dil. P.L. 1851	$\frac{1}{11}$ or	37 in 411
Ditto containing $\frac{1}{10}$ of anhydrous acid	$\frac{1}{10}$ "	37 " 370
Ditto with 1 equiv. in $\frac{z}{3}$j. fluid=480 minims	$\frac{1}{13}$ "	37 " 480
Acid. Nitric. dil. P.L.	$\frac{1}{8.3}$ "	54 " 450
Ditto containing $\frac{1}{10}$ anhydrous acid	$\frac{1}{10}$ "	54 " 540
Ditto containing 1 equiv. in $\frac{z}{3}$j. fluid=480 minims	$\frac{1}{9}$ "	54 " 480
Acid. Phosphor. dil. P.L.	$\frac{1}{11.5}$ "	72 " 828
Ditto containing $\frac{1}{10}$ anhydrous acid	$\frac{1}{10}$ "	72 " 720
Ditto containing 1 equiv. in 480 minims	$\frac{1}{6.6}$ "	72 " 480
Acid Sulph. dil. P.L.	$\frac{1}{8}$ "	40 " 320
Ditto containing $\frac{1}{10}$ anhydrous acid	$\frac{1}{10}$ "	40 " 400
Ditto containing 1 equiv. in 480 minims	$\frac{1}{12}$ "	40 " 480
Liq. Potassæ, P.L.	$\frac{1}{15}$ "	48 " 717
Ditto containing $\frac{1}{10}$ anhydrous KO	$\frac{1}{10}$ "	48 " 480
Ditto containing 1 equiv. in 480 minims	$\frac{1}{10}$ "	48 " 480
Liq. Ammoniæ, P.L.	$\frac{1}{10}$ "	17 " 170
Ditto containing $\frac{1}{10}$ anhydrous ammonia	$\frac{1}{10}$ "	17 " 170
Ditto containing 1 equiv. in 480 minims	$\frac{1}{28}$ "	17 " 480
Liq. Sodæ, P.L.	$\frac{1}{25}$ "	41 "1025
Ditto containing $\frac{1}{10}$ anhydrous soda	$\frac{1}{10}$ "	41 " 410
Ditto containing 1 equiv. in 480 minims	$\frac{1}{11.7}$ "	41 " 480

Keeping in view the principle I have named, the retention, as near as possible, of the present strength, it will appear from the table that the hydrochloric, the phosphoric, and the sulphuric acids agree best with the dilution of one part anhydrous acid with nine parts water. Whilst the nitric acid, having its equivalent diluted to 480 parts, comes nearest the mark; at the same time were the latter principle adopted in the case of the first-named acids, the alteration in strength would not involve any material alteration in dose if it offers advantages in other respects.

In this case the strength of all the acids would be slightly reduced. The only non-conforming acid would be the phosphoric, which would be reduced to orthodoxy by using $\frac{1}{2}$ an equivalent in 480 parts.

With respect to the solutions of the alkalies, liq. potassæ must be reduced from its present strength=6.7 per cent. to 5 per cent., when it exactly fits either system, being $\frac{1}{2}$ an equivalent in 480 parts, or one part of anhydrous potash in 20 of water.

Liq. sodæ must be increased in strength from four to five per cent. when it comes into the same category as liq. potassæ.

Liq. ammoniæ must either be left as at present,=$\frac{1}{10}$ of anhydrous ammonia, or very slightly increased in strength, so that three equivalents shall be contained in 480 parts,=$\frac{1}{9.4}$.

We thus see that whichever of these plans be adopted, the prescriber will have no difficulty in ordering the doses of the pure acids and alkalies, which is what in the great majority of cases he wants.

The difficulty will be in apportioning the dose when he wishes to give the acids in combination with the alkalies, when they are not kept in solution, because he has to recollect not only the equivalent of the acid, but also that of the salt, complicated with its amount of water of crystallization. This difficulty is very much smoothed by the equivalent of the acid being combined with a definite amount of water.

Thus he wants to order nitrate of potash, say six doses of eight grains each; he recollects the equivalent of nitric acid to be 54 and that of potash to be 48,

and as he wants 48 grs. of nitrate, therefore he will require about 25 grs. acid with 22½ of potash; he discards, therefore, all consideration of the equivalent of the carbonate, and merely directs the proper quantity of the acid to be saturated with the carbonate or bicarbonate of potash.

If he wants to give the nitrate in effervescence he must, of course, direct the equivalent quantity of the carbonate.

This example gives a striking instance of the great advantage of diluting one part of the anhydrous substance with nine of water, from its facile reduction to the equivalent system, and great help in calculation. Thus, in the above example, to ascertain the quantity of acid solution containing 25 grs. a rule of three sum is required; but on the other plan, without calculation, 25 grs. is seen to be contained in 250 grs. of solution. I have not time to pursue the subject further, but I think it is evident that the plan I have last named is adequate, from its great comprehensiveness, to fulfil all the requirements of the case.

In connexion with this subject, I will only express my regret should we be obliged to perpetuate the anomalous divisions of the fluid ounce. Why cannot the College of Physicians take the bull by the horns, and, as is befitting a body in advance of the rest of the community, give us a decimal division of weights and measures? I am quite sure many months would not elapse before all of us engaged in accurate pharmaceutical operations would look back with dismay at the waste of time which formerly attended our pursuits.

Stratford-on-Avon, March 20th, 1856.

PHYTOLOGICAL CLUB.

17, *Bloomsbury Square, April 9th*, 1856.

ROBERT BENTLEY, F.L.S., PRESIDENT, IN THE CHAIR.

Two new Members were elected. After the ordinary business of the meeting, the subject of the Botanical excursion was taken into consideration. It was proposed that it should take place in the month of June, the time and place of meeting to be decided on at the next meeting in May. Members who are desirous of joining the excursion are requested to attend at the next meeting, or to send in their names to the Secretary of the Phytological Club, at 17, Bloomsbury Square, who will communicate to them the details of the arrangements as soon as they are decided on.

The meeting was then adjourned to Wednesday, May 14th.

PHARMACEUTICAL SOCIETY.

NORTH BRITISH BRANCH.

The last Scientific Meeting of the Pharmaceutical Society for the present Session was held at Edinburgh, on Friday evening, the 11th of April,

MR. JAMES GARDNER, PRESIDENT, IN THE CHAIR.

Dr. Stevenson Macadam, at the request of the President, proceeded to read the Prize Essay on Carbon, and when finished, remarked, that it afforded him much pleasure to be allowed once again to bring before the Society the names of those students who had been successful in gaining the prizes so liberally awarded by the President. In regard to the Essay Prize, two papers had been given in, both of which were of great merit, and reflected much credit on the authors, Messrs. Grigor and Crease. The memoir written by Mr. Grigor was an able autobiography of an atom of carbon, detailing its sojourn through several of its countless phases or spheres of action, including its unions and disunions with other elements. The paper was copiously interspersed with the *sayings* as well as the *doings* of the carbon atom, and altogether contained much scientific truth embodied in a novel and a familiar style. The essay handed in by Mr. Crease was comprehensive and truthful in its details, but did not fulfil the condition of being a "biography," or an

"autobiography." Dr. Macadam, therefore, decided that the Essay Prize should be awarded to Mr. William Grigor.

At the written examination of the class, the following six questions were proposed and answered:—

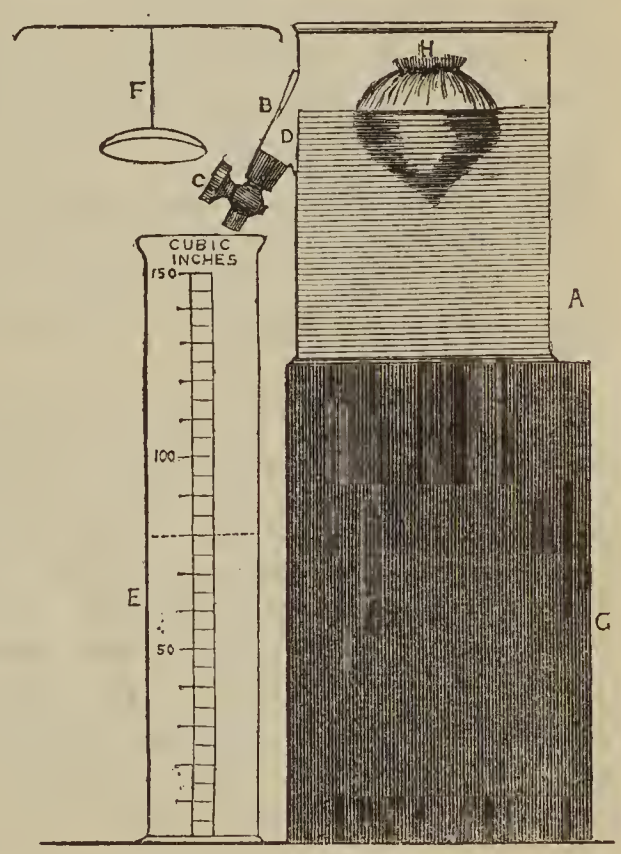
1. State the mode of preparation of H Cy.
2. Describe the process for extracting morphia from opium, and mention its tests.
3. Name the sources and properties of albumen.
4. State the process for preparing oxygen, and mention its relation to ordinary combustion.
5. Name the tests for iron.
6. State the mode of preparation and composition of sugar of lead.

Two sets of answers were given in, both of which were well written, and displayed a good acquaintance with chemistry on the part of the competitors, Messrs. Forrester and Ostler. The answers returned by Mr. Forrester were best, and accordingly he gained the prize.

At the request of the President, Dr. Macadam then handed the Essay Prize (*Fownes's Chemistry*) to Mr. William Grigor, and the Examination Prize (*Fownes's Chemistry*) to Mr. James Forrester.

A new apparatus, invented by Mr. P. Stevenson, for taking the specific gravity of floating bodies, was then described, and shown in operation.

DESCRIPTION OF A NEW APPARATUS FOR TAKING THE SPECIFIC GRAVITY OF FLOATING BODIES, &c.



The principle upon which this apparatus is constructed is very simple, and of great antiquity. Pure water, at the temperature of 60° Fah., has long been adopted as the standard of comparison for the specific gravity of all solid and liquid bodies. The principle of specific gravity, first discovered by Archimedes, may be stated thus:—A body which floats in water displaces exactly its weight of that liquid; and a body which sinks or is submerged, displaces precisely its bulk of water. When once the weight and bulk of a body are determined, the specific gravity is found by dividing its own weight by that of its bulk of water. The principle of displacement has been long known, and a variety of instruments have been constructed, founded upon it, to serve numerous purposes; yet hitherto no one appears to have been made fitted to determine conveniently the specific gravity of bodies of irregular shape and size. This want is supplied in the apparatus now submitted. It consists of two glass jars, one of which, *A* (see figure), is made 8 inches in diameter by 12 inches in height. Three inches down from the mouth, on the side of the jar, is a large drooping tubular *B*, to which is attached a stopcock *C*. Across the tubular, inside of the jar, is fixed a metal gauge *D*, having a very thin horizontal straight edge, which determines exactly the water-level in the jar, and over which the surplus flows, and is let off by the stopcock.

The other jar *E* is 3½ inches in diameter by 20 inches in height, and is accurately graduated on the sides with three lines of divisions, viz., cubic inches, avoirdupois lbs. and oz., and thousandth parts of a gallon. The brass piece *F* is used to depress the floating body below the water-level, and to retain it there; the upper part of *F* grasps the rim of the jar *A*. *G* is the case in which the whole is carefully fitted for conveyance, and serves as a stand upon which to raise the jar *A* when in use.

Directions.—Take the apparatus out of the case, place the glasses as shown in the

figure, shut the stopcock, and fill the jar *A* with water, a little above the guage; let the water come to rest, then open the stopcock, and allow the surplus to run away, so as to adjust the water-level in the jar. Now shut the stopcock, and introduce gently into the water the body whose specific gravity is to be determined; for example, a root that will float, as *H*. The water will immediately rise in the jar; let it come to rest; open the stopcock, and receive the water that will now run out, in the graduated glass jar *E*. When the water has ceased to flow from the stopcock, record the quantity which has been received, as shown by the graduations on the different scales. *This is the weight-indication of the root* (1). Again, shut the stopcock, and depress the root by using the brass piece *F;* and when the water has come to rest, open the stopcock, and let the liquid which will again flow out add itself to that already in the graduated jar. When this additional quantity has been received, record the larger amount now shown on the scales. *This is the bulk-indication of the root* (2). Suppose the cubic inch scale used, and the first or weight-indication (1) to be 80 cubic inches; the second (2) or bulk-indication 100 cubic inches, divide 80 by 100, and the specific gravity is 0.800.

To determine the specific gravity of bodies a *little* heavier than water, make a solution of salt, sugar, or muriate of lime, that will float the body; ascertain the specific gravity of the solution, multiply the weight-indication by this specific gravity, and divide by the bulk-indication. The result will be the specific gravity of the body. Thus, suppose the solution used is—

Specific gravity	1.210
The weight-indication	100
The bulk-indication	105

multiply 100 by 1.210, and divide by 105, the resulting specific gravity is 1.200.

The apparatus may be used in assisting to determine the specific gravity of mineral or other heavy masses; the weight of such masses being first ascertained in a balance, the bulk can be obtained in the same manner as above described; then calculate in the usual way.

The price of the apparatus, complete in a fir case, is £3 3*s*.

This apparatus having been exhibited and described to the Royal Scottish Society of Arts, the Society appointed a Committee, consisting of Dr. George Wilson, Professor of Technology, Dr. Wm. Gregory, Professor of Chemistry, and Mr. Thomas Dunn, Optician, Edinburgh. The following is a copy of their report:—

"*Edinburgh, July* 23*rd*, 1855.

"The apparatus devised by Mr. Stevenson is an ingenious and successful application of the method of taking densities first practised by Archimedes. It was constructed to meet the difficulty experienced by agriculturists in estimating the specific gravity of roots, such as turnips, lighter than water, and has been found in practice to determine this datum rapidly and accurately. In addition, however, it ascertains the absolute weight of any floating body, by measuring the volume of water which it displaces in floating. It is thus applicable without the intervention of a balance to the determination of the absolute as well as the specific weight of solids less dense than water, and is therefore available in all cases where such double determinations are desirable. As a cheap, simple, and easily-applied instrument, which physiologists, pathologists, agriculturists, and other scientific men would find useful, we recommend it to the favourable consideration of the Society, and beg to refer it to the consideration of the Prize Committee.

"(Signed) George Wilson, *Convener.*
William Gregory.
Thomas Dunn.

"*N.B.* The Society have awarded their Silver Medal, value seven sovereigns."

The President then read the following Valedictory Address:—

Gentlemen,—Having arrived at the conclusion of another Session of the Scientific Meetings of the Pharmaceutical Society, it may afford the Members, Associates, and Apprentices some pleasure and satisfaction to take a brief glance at the work that has been done.

At the first meeting on 30th October we had the Introductory Address by Dr. Douglas Maclagan, full of everything calculated to guide us, not only in the improvement of our ordinary daily business as dispensing chemists, but also to elevate our present position to the rank of a scientific profession; and I hope I am not saying

too much when I trust Dr. Maclagan's address may be revived at many future meetings of the Pharmaceutical Society. At the same meeting we had a most interesting paper from Dr. Macadam, on the most recent Improvements in the Manufacture of Sulphuric Acid. Considering the vast importance of sulphuric acid in the manufactures of this country, it is next to impossible to overrate the value of this paper.

At the second meeting, on the 19th December, there were three papers. First, we were much indebted to Mr. J. F. Macfarlan for a most interesting paper on Methylated Spirit, its Preparation and Uses in the Arts and Manufactures; secondly, to Mr. John Mackay, for some very useful information, both medical and commercial, as to the Adulterations of Acetate of Lead; thirdly, to Mr. Young for samples of, and some valuable information about, the finer kinds of Scammony.

A new Die for stamping paper, at moderate price (by Messrs. Hume & Melville), and an improved Microscope, by Mr. Hart, North College Street, were exhibited.

At the third meeting, on the 8th February, we had two papers. Dr. Macadam gave one on the Manufacture of Soap. This paper must be exceedingly useful and interesting to all those engaged in the manufacture of an article so universally in demand. Secondly, Mr. Brown's valuable paper on the Sweet Spirit of Nitre. It is hoped that the information contained in this paper may do much to direct attention to this preparation, and render its manufacture more satisfactory than formerly.

At this meeting, Bunsen's Improved Gas Lamp was exhibited; it will be found a valuable method of applying gas where considerable heat is wanted.

Fourth meeting on the 7th March. On this occasion a crowded meeting enjoyed the pleasure of hearing Professor George Wilson on Pharmacy as a Branch of Technology. Any members (or others) who may have been absent on that occasion will find a full report in the Journal for April, which will amply repay a perusal.

A simplification of Marsh's test for detecting arsenic, and a new Museum Jar, both by Mr. Peter Stevenson, were exhibited and much approved of.

This, the fifth, meeting being under your own observation, it is unnecessary for me to say anything further than to congratulate the young men who have been the successful competitors in Dr. Macadam's class, and to hope that the unsuccessful will not be discouraged, and that they will again compete with redoubled diligence on the first opportunity that presents itself.

This enumeration of the work of the fourth session must be very gratifying to all who take an interest in the Pharmaceutical Society, or in the improvement of Pharmacy for the public benefit.

Before retiring from the chair of this Society, I would earnestly wish to impress the minds of the younger members with the importance of storing all the knowledge they can, and taking advantage of all the facilities they enjoy of evening lectures, an excellent library, and considerably more time than fell to the share of the apprentices in the early days of many members now present.

At the opening of this session I appealed to all the members of this Society, and to all employers, that they would give their young men as much time as possible for professional improvement, and expressed a hope that the more time given for study the greater would be the attention of the young men to their daily duties and the interests of their employers. I sincerely hope that the employers have not been disappointed with the result of these arrangements, but have found increased assiduity and attention for the privileges granted.

I cannot finish without alluding to the valuable support afforded to the Pharmaceutical Society by Dr. Macadam as a lecturer, also as ever ready to assist and encourage any one who had a wish for improvement. And, lastly, I sincerely trust that the fifth session, in the hands of our excellent friends Messrs. Robertson and Flockhart, will develop an increase of scientific progression that will far exceed any previous session.

My duties as President having now drawn to a close, allow me to return you my sincere thanks for your uniform kind indulgence on every occasion of our meeting together during the past session.

At the close of the meeting a vote of thanks was proposed by Mr. Young, and most enthusiastically carried, to Mr. Gardner, for his conduct as President during the past year.

Mr. Mackay also proposed, "That the Society take the present opportunity to thank Dr. Macadam for the unwearied interest he continued to manifest in imparting

a knowledge of Chemistry to Pharmaceutists, and especially for his kindness in lecturing at so late an hour in the evening for the purpose of suiting the convenience of those engaged during the day;" which was carried unanimously, and with acclamation.

THE ANNUAL MEETING

took place at Edinburgh, in 72, Princes Street, on Monday 14th, April, at two o'clock P.M.,

MR. JAMES GARDNER IN THE CHAIR.

At the request of the Chairman, the Secretary read the following Annual Report:—

The Council have much pleasure in again meeting the Members of the Pharmaceutical Society, and of presenting this their Annual Report for the approval of those now present.

During the session which has passed they have good reason to congratulate all connected with the Society upon the decided improvement which has been manifested in various departments, but more especially in the character of the scientific meetings held throughout the winter months. In confirmation of this statement they refer to the Journal, wherein communications read at these meetings have appeared, as well as to the Members, Associates, and others who gave their personal attendance. These facts go far to substantiate what is now advanced, and the Council are in hopes that by next session a regular system of scientific meetings may be established on a certain day of each month, and they take this opportunity of requesting the assistance and co-operation of all favourable to such a movement.

The Council refer with satisfaction to Dr. Macadam's evening lectures, which have been conducted in a very able and efficient manner. They have again to thank Dr. M. for having accommodated the Society by lecturing at such a late hour in the evening, with a view to enable young men, who cannot be spared from business during the day, to obtain from his prelections a knowledge of that science which constitutes the basis of nearly all their daily occupations.

It is matter of regret that so few have joined the Society during the past year. The Council refer to Scotland; and as much misconception appears to exist regarding the payment of the single fee now exigible from Members entering the Society, they beg distinctly to state that no further annual subscription or payment of any kind is required beyond the £15 15*s*. It may be further stated that the framers of the Pharmacy Bill did not lose sight of the probable objection to this single imperative payment; but as this is payable by Members only, and as many years were given and invitations issued to all who wished to avail themselves of the old system of entry-money and annual subscriptions, they purposely spread the single payment over a lengthened period *for all juniors* who were desirous of becoming connected with the Association. Thus, the qualified Apprentice pays on admission £2 2*s*. At the termination of his indenture, or at any future time, he may be taken on his Minor Examination, and then pays £3 3*s*. if passed by the Board, and becomes an Associate. When he again applies for his Major Examination, he, if found qualified, pays £5 5*s*., which places him in the position of Registered Pharmaceutical Chemist, and enables him to become a Member of the Pharmaceutical Society on paying £5 5*s*. more as a final sum for life. When it is considered how long many of the present Members have laboured and paid their subscriptions, it is believed that few will consider the new fees under the Act either unreasonable or unjust. The Council have only further to remind parties desirous of registering Apprentices, that distinct provision is made in the laws of the Society for certification of the classical examination by schoolmaster, clergyman, surgeon, or physician, in every case where the residence of the individual shall be ten miles distant from London or Edinburgh. Such certificates, if passed by the Board, admits the applicant as Registered Pupil or Apprentice to the Society, and entitles the party, along with Members and Associates, to receive a copy of the monthly Journal free of charge.

The following is a statement of the account of the Society's expenditure in Edinburgh during the year commencing 1st January and terminating 31st December, 1855. The committee have only to remark that they conceive the outlay to have been made with judgment and economy. Additional books were required for the Library, while another case for the Museum-room was indispensable, and indeed so many specimens had accumulated that even now extra space is required to show

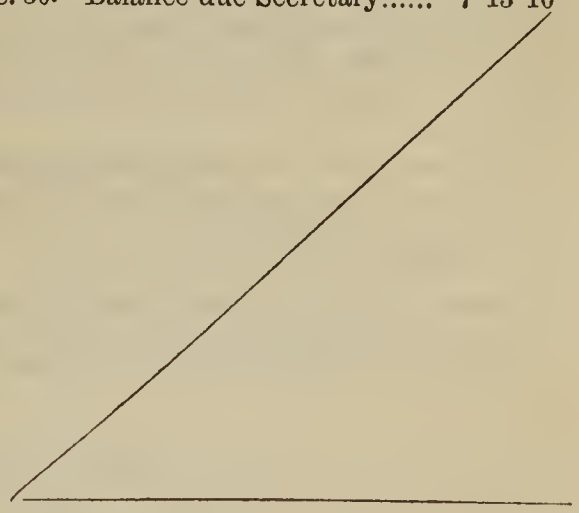
them to advantage. In submitting the account the Council beg to thank Messrs. Ainslie, Wm. Baildon, Shaw, and Young, who have so regularly attended as Curators to the Museum and Library, and to name with regret the departure of Mr. Shaw to England, who has so long evinced much zeal and interest in everything connected with the success of the Society here.

The Pharmaceutical Society in Edinburgh in account with the Secretary.

Dr. FROM 1st JANUARY, TO 31st DECEMBER, 1855. *Cr.*

1855. Dec. 31.	£	s.	d.
Shelving in Back Room and new Museum Cases	11	1	1
Advertising	0	13	9
Water Duty	0	4	6
Various Taxes	3	2	2½
Ditto for Landlord, deducted from Rent	1	11	9½
Various Postages	2	12	6
Carriage of Specimens, &c.	0	7	3
Attendance of Porter at Meetings, and delivering Town Billets	1	4	6
Cleaning Room	1	4	0
Coals	0	3	8
Printing	3	17	0
Expenses at Annual Meeting	2	2	0
Rent of Room, less Taxes	19	19	0
Insurance	0	10	2
Books for Library	8	5	11
Painter	0	7	6
Gas	0	7	0
	£57	13	10
Balance due Secretary	£7	13	10

1855.		£	s.	d.
Oct. 6.	By Cash	50	0	0
Dec. 30.	Balance due Secretary	7	13	10
		£57	13	10



Edinburgh, 9th April, 1856.

We, the undersigned, have examined the foregoing accounts, with vouchers attached, and find them correctly stated; and that the balance due to the Secretary, as at 31st December, 1855, is the sum of seven pounds, thirteen shillings, and tenpence sterling.

JAMES GARDNER,
H. C. BAILDON,
JAS. ROBERTSON.

The Library now comprehends more than 100 volumes, and some of them valuable works on Chemistry and other sciences. As every facility has been, and will continue to be, given for the distribution of the various books belonging to the Society, the Council will be glad to find an increased demand for the perusal of the different volumes in the list, which will be found at the rooms during the week, and upon the Wednesday evenings when the books are given out.

The Council are sorry that they cannot report any further progress regarding a National Pharmacopœia. Beyond the examination, correction, and addition to a printed list of articles and preparations at present in the Pharmacopœia, no further steps have been taken here in connexion with the subject, but a special Committee will be appointed to act with the Pharmacopœia Committee in London, or to forward in any other way this most desirable object, as they are more than ever satisfied of the crying evil attendant upon so much discrepancy and contradiction evinced by the three Colleges in their different formulæ as at present published.

The Council have further to state that by recent arrangement the Museum cases have been moved from the small into the large front room, and in order that the various specimens be made available to those entitled to their use, the keys of the cases will at all times be found with Mr. Baildon, while the room itself will be open every day from ten in the morning throughout.

As the Council meditate still further additions to the Museum and Library, and as the rent of the two rooms has been necessarily advanced from and after Whitsunday next, it is to be hoped that the Society in London will aid that portion of the Association established here by the bestowal of a suitable grant for the expenses of the current year.

Mr. Gardner moved that the report now read be approved and adopted, which was seconded by Mr. Robertson, and unanimously carried.

Mr. H. C. Baildon proposed Mr. James Robertson as President of the Society in Edinburgh for the following year. This was seconded by Mr. Ainslie, and agreed to.

Mr. Young proposed that Mr. Flockhart be elected Vice-President for the following year, which was seconded by Mr. Aitken, and carried.

Mr. Aitken proposed that the following gentlemen be elected Members of Council for the next year:—President and Vice-President, Messrs. Ainslie, Brown of Dunfermline, Young, G. Blanshard, Anderson of Musselburgh, Mackay, Welsh of Dalkeith, Tait, Steele, Lindsay, Gardner, and Macfarlan. This was carried unanimously.

Mr. Ainslie proposed that the following gentlemen be recommended as Examiners: —Messrs. Robertson, Flockhart, Baildon, Gardner, Aitken, Tait, Macfarlan, Mackay, President and Vice-President of the Society in London *ex officio*. Seconded by Mr. Shield of Arbroath, and carried.

The Chairman moved that Mr. Macfarlan be requested to continue his labour as representative at the Council Board in London, and expressed regret at his absence from the present meeting, more especially as the cause was indisposition. This was agreed to.

Mr. Robertson proposed that Messrs. Ainslie, Young, Wm. Baildon, and Wardlaw Macfarlane, be appointed Curators of Museum and Library. Seconded by Mr. Gardner, and agreed to.

Mr. Robertson proposed that Mr. John Mackay be requested to continue to act as Secretary, which was seconded by Mr. Baildon, and carried with acclamation.

A vote of thanks having been moved to Mr. Gardner as chairman, was most enthusiastically responded to, and the meeting separated.

THE ANNUAL DINNER

Took place in the Waterloo Hotel, on Monday, 14th April, at six o'clock.

MR. JAMES ROBERTSON, PRESIDENT, IN THE CHAIR.
MR. WILLIAM FLOCKHART, VICE-PRESIDENT, *Croupier.*

About thirty Members, including a few from a distance, dined together. Notes of apology were read by the Secretary from Professor Christison. Dr. Douglas Maclagan, Professor George Wilson, Mr. G. Blanchard, Mr. W. Murdoch, &c. After the usual loyal toasts, the following were proposed and warmly responded to:—"The University of Edinburgh," by Mr. Hart, of Glasgow; "The Colleges of Physicians and Surgeons," by the Croupier; "The Pharmaceutical Society," by Dr. S. Macadam; "The President, Vice-President, and Council in London," by Mr. Baildon; "The Honorary Members of the Pharmaceutical Society in Scotland," by Mr. Anderson of Musselburgh; "Pharmaceutical Education," by Mr. John Mackay; "The Board of Examination and Council in Edinburgh," by Mr. Murdoch, of Glasgow; "Members from a distance," by Mr. D. Brown; "Dr. S. Macadam," by the Croupier; "The Chairman," by Mr. Hart; "The Retiring Chairman," by Mr. Baildon; "The Croupier," by Mr. Mackay; "The Associates and Apprentices," by Mr. Aitken; "Jacob Bell, Esq., London," by Mr. Baildon; "The Secretary," by Dr. S. Macadam. Messrs. Kennard, Ainslie, Lindsay, and others, enlivened the meeting by their vocal powers, and the evening was spent in a most pleasant and agreeable manner. One feeling appeared to animate those present, namely, the anxious desire that nothing should from henceforth interfere to mar the prosperity or retard the progress of the Society. Many of the speakers gave utterance to such sentiments, which were most heartily responded to by all present, and very soon after Mr. Mackenzie's hour the company dispersed, well pleased with the happy social hours they had spent.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

Royal Institution, Thursday, 28th February, 1856.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

THE SECRETARY announced a donation to the Museum of a number of labels for specimens from the Pharmaceutical Society of Great Britain.

Mr. J. ATKINSON exhibited and explained an Electric Clock of an improved and ingenious construction.

Mr. MERCER delivered a lecture on the "Manufacture of Calomel."

The thanks of the meeting were passed to the Pharmaceutical Society for their donation, and to Messrs. Atkinson and Mercer for their communications.

Thursday, 13*th March*, 1856.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

Don Manuel Pacheco was elected a member of the Association.

The following donations to the Museum were announced:—From Messrs. Evans, Sons, & Co., a large root, *Tampico Sarzæ*; and a fine collection of ferns and mosses from Mr. A. Redford, arranged in a book presented by Messrs. Fearnall & Co.

Dr. EDWARDS delivered a lecture on "Organic Chemistry—the Theory of Types."

The thanks of the meeting were presented to the donors to the Museum, and to Dr. Edwards for his instructive lecture.

Thursday, 27*th March*, 1856.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

Two specimens of Wood Oil, or East Indian Copaiba, were presented to the Museum by Messrs. Evans, Sons, & Co.

A lecture, of which the following is an abstract, was then delivered:—

ON THE CHEMICAL CONSTITUENTS OF CINCHONA BARKS.

BY H. SUGDEN EVANS, F.C.S.

The chemical value of cinchona bark depends chiefly upon the amount and proportion of the alkaloids, but is regulated by the relative proportion of tannin and colouring matters present. That bark is the most highly prized which contains the largest quantity of quina, and smallest of colouring matter.

Mr. Evans described at length the various methods of analysing barks, qualitatively and quantitatively, recommending the application of the ether, with the chloroform test, whereby the whole of the alkaloids could be estimated, as well as their relative proportions, in a very short and easy way. The manufacture of quinine was fully discussed, and the processes of the three colleges, and those more recently patented, explained.

The chemical constitution and properties of the cinchona alkaloids were discussed, Mr. Evans drawing special attention to their being isomeric modifications of each other:—Thus; of quina (C_{20} H_{12} O_2 N), quinidine, quinoidine, and quinicine; of cinchonia C_{20} H_{12} O, N), cinchonidine, and cinchonicine.

The optical properties of these alkaloids, and their salts, are very remarkable; thus it is found that the crystals of quina salts turn the plane of polarization to the right, that is to say, when viewed under the polarizing microscope, and the polarizing prism is turned in the course of the sun, the prismatic colours follow in the order, blue, green, yellow, orange, red, violet; the salts of cinchonidine and quinicine influence the ray in precisely the same way. But cinchonia salts, and those of quinidine, and cinchonicine, turn the plane of polarization to the left, the colours following in the reverse order. These polarizing properties of the cinchona salts are very marked, and with care may be easily observed, serving to point out their admixture, and in the case of quina and quinidine, or quina and cinchonia, may be advantageously made use of as a test.

In conclusion, Mr. Evans detailed the various adulterations quinine was subjected to, and described the means of detecting them, recommending the use of Herapath's microscope test for quinine, and Zimmer's ammoniated ether test for quinidine, cinchonia, and other admixtures.

After a discussion on some of the points alluded to in Mr. Evans's valuable lecture, Dr. Edwards reported the result of the analysis of two samples of carbonate of potash, the insolubility of one of which had been alluded to by Mr. Alpass at a former meeting. He found them both very fair samples, and with no other peculiarity than that one contained a little silica, and the other a little alumina. He thought the apparent insolubility noticed by Mr. Alpass, had arisen from some accidental circumstance.

A little discussion ensued on the question whether or no carbonate of potash absorbed carbonic acid by exposure to the air, and was partially converted into bicarbonate; after which a vote of thanks was passed to Mr. Evans for his lecture, and to Dr. Edwards for his analyses.

Thursday, 10*th April*, 1856.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

Mr. Richard Parkinson was elected a Member of the Society.

The SECRETARY announced donations to the Museum of a fine specimen of asbestos from Mr. Pierce, of London; sixty-seven specimens of English grasses, arranged in a book, from Mr. Abraham; two specimens of safflower, from Mr. Mercer.

He also announced that Mr. T. C. Archer had kindly offered to allow the Members to attend his lectures on Botany at the Royal Infirmary School of Medicine for half the usual fee.

Dr. EDWARDS made a very gratifying report of the progress made by the pupils in the laboratory during the session which has just closed, and of the result of the competition for the "President's Prize," from which it appeared that the successful competitor was Mr. William Kitchen, Apprentice to Mr. T. D. Walker.

The PRESIDENT congratulated Mr. Kitchen on his success, and will present the Prize at the next meeting.

Dr. Edwards then delivered his lecture on the "Vegetable Acids," in which he brought under review and illustrated with experiments and diagrams the characteristics and properties of the more important vegetable acids used in Pharmacy.

The thanks of the meeting were passed to Dr. Edwards, and also to the donors to the Museum.

ORIGINAL AND EXTRACTED ARTICLES.

ON HERMODACTYLS.

BY DR. J. E. PLANCHON.

(*Concluded from page* 468.)

HAVING shown the strong probability of the Hermodactyl of recent times being identical with that held in such high esteem by the old Greek and Arabian physicians, at least in so far as both being the cormi of a species of *Colchicum*, and having expressed the opinion that the officinal Hermodactyl will be found to be derived from the *Colchicum variegatum* of Cornuti, Dr. Planchon devotes a chapter to the enumeration and description of *False Hermodactyls*, that is, of those substances, which have been supposed identical with the classic drug.

1. *Colchicum autumnale.*—Among the older botanists, Ruellius, Matthiolus, Tragus and Fuchsius, have erroneously supposed the officinal Hermodactyl to be the cormus of this plant, an error which in recent times has received the support of Sir Henry Halford and Mr. Want. As the incorrectness of this opinion has been established by many authors on Materia Medica, it is needless to insist upon it further.

2. *Hermodactyls of Egypt.*—The author under this head, quotes the statement of Prosper Alpinus (*De Medicinâ Ægyptior.*, l. iii., p. 234), that some of the Egyptian women were in the habit of eating certain roasted bulbs, which he regarded as Hermodactyls. If these Hermodactyls were indigenous to the country, we must regard them, says our author, as the produce of *Colchicum bulbocodioides*, that being the only species which we know as occurring in Egypt. Its cormi, however, are rarely larger than hazel-nuts, and often smaller, so that it is difficult to think they could have been confounded with the Hermodactyls of commerce.

3. *Hermodactyl of Anguillara*, produce of the so-called *Colchicum Illyricum*, a plant altogether imaginary, and the result of the combined blunder of L'Obel and old Gerarde, author of the *Herbal*, as Dr. Planchon has most clearly set forth.

4. *Hermodactyl of Matthiolus.*—Under the persuasion that the Hermodactyl of the Arabs and that of the shops were not identical with the *Hermodactylos* of the Greeks, Adreas Matthiolus determined on discovering the latter anywhere

than among the colchicums. The tubers of *Orchis maculata* appear first to have attracted his attention, and their palmate form might in reality have warranted the old Greek name. This is the opinion he offers with some reserve in the fine edition of his *Commentaries*, published at Venice in 1554. But later, in the edition of 1565, he is firmly convinced he has discovered the *Hermodactylos* of the Greeks in a plant which had been sent to him from Constantinople by the celebrated Busbequius, and, as such, he figured it as *Hermodactylus verus*. This plant is none other than *Iris tuberosa* of Linnæus, now separated into a new genus under the misleading designation of *Hermodactylus*. Errors of Linnæus in misinterpreting Matthiolus and Tournefort have added to the confusion, so that even recent authors have cited *Iris tuberosa* as the source of Hermodactyls.

5. *Hermodactyl of Brunfels.*—Otho Brunfels, in his work intituled *Herbarum vivæ eicones* (ann. 1532) confounds Hermodactyl with Narcissus, and represents as such (t. i., p. 129) two very different plants, *Narcissus Pseudo-narcissus*, and *Galanthus nivalis*.

6. *Pseudo-hermodactyl of Matthiolus* is the tuber of *Erythronium Dens Canis* L.

7. *Hermodactyl of some German authors*, *Cyclamen Europæum* L.

8. *Hermodactylos of Myrepsus and Actuarius.*—Two of the ingredients in the *Antidotus aurea Alexandri* of Myrepsus, are White and Red Hermodactyls. By these, according to Fuchsius, we must understand White and Red Behen. The same interpretation will apply to similar expressions of Actuarius.

9. *Hermodactyl of Finch.*—The opinion of one Finch, quoted by Parkinson in his *Theatrum Botanicum*, appears to have been that Hermodactyls were the seeds of *Trapa natans*, an opinion about as reasonable as that of Pomet, who gravely asserts them to be the fruits of a large tree growing in Egypt.

To close this long enumeration of errors, our author cites Virey, who, after referring Hermodactyls to *Colchicum Illyricum*, adds, that by some they are attributed to *Amaryllis lutea*.

In the second part of his memoir Dr. Planchon enters at considerable length into the botanical questions touching the underground organs of the Colchicums and of *Hermodactylus tuberosus*. Referring our readers for full details to the memoir itself, we extract the following:—

> At the period of flowering, the cormus of *Colchicum autumnale* is surrounded by two perfectly closed tunics, the upper part of which is prolonged into a sheath around the flowering stem. These tunics represent imperfect leaves, or we may say, spathes, developed the previous autumn at the base of the then-flowering stem, of which stem there now remains nothing more than its base, expanded into a fleshy cormus. This cormus, slowly formed between one autumn and another, bears two buds: one partially developed, since it is about to flower; the other less advanced, often abortive, or at least but little developed, and, as it were, supplementary. The first named bud, or more correctly the flower stem, is inserted on the anterior face of the cormus, upon an unguiform process of its base; it is partly fitted into a groove which its pressure has produced on the face of the comus. From its base spring numerous radical fibres, embraced by a short coleorhiza with two transversely-spreading lips. Its first leaf is a scarious sheath, of which a few ragged remains are all that exist at the period of flowering, and which sheath has appeared to us opposed to that which lies immediately over it. The two succeeding sheaths are cylindrical and white, surrounding the flowers and young leaves, and destined the following year to clothe the new cormus which will be formed by the enlargement of the base of the now-flowering stem. The second bud is lodged in a furrow on the convex dorsal side of the cormus and near its summit. As with the other, there is at its base a bundle of radical fibres embraced by a narrow-lipped coleorhiza. Above this dorsal bud, and on the very point of the cormus, are to be seen the dried remains of the stem, of which it formed the base, a stem which perished after the ripening of its fruits. Lastly, toward the

base of the convex or dorsal side of the cormus, a rounded cicatrix is visible, indicating its point of attachment to the old cormus from which it started.

* * * * * * * *

The remarkable differences which we have noticed in the cormi of *Colchicum variegatum* [see p. 467] are probably to be found also in other species. One may presume that the rounded form arises from the lower bud, and the slenderer, dactyloid form from the upper. The inferior process of the cormus of

Fig. 1.

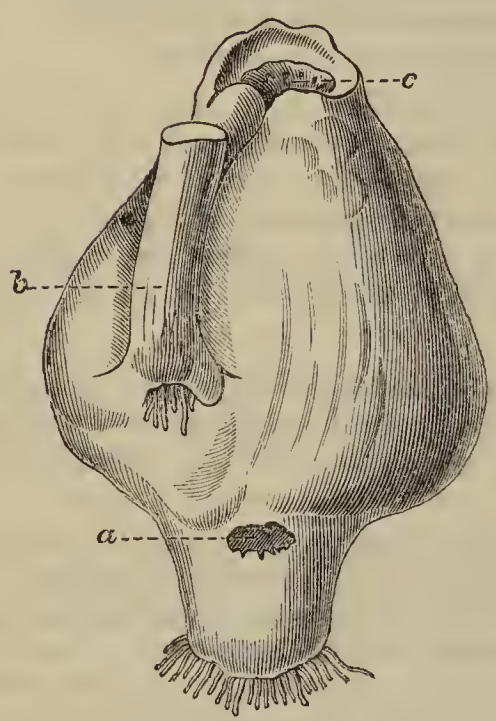
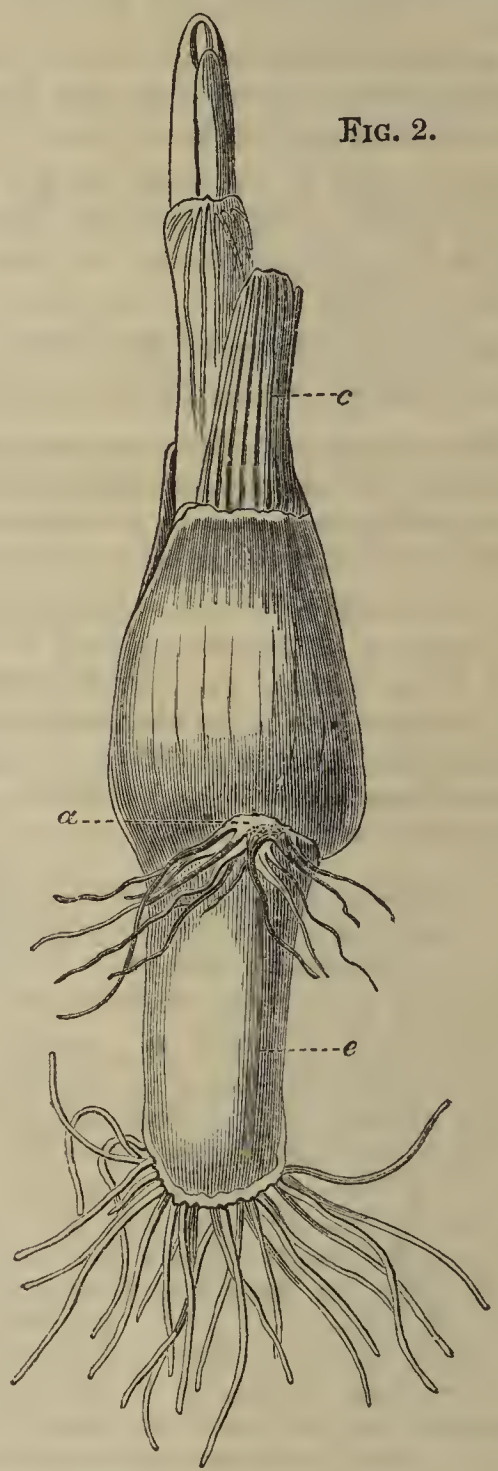


Fig. 2.



Cormi of *Colchicum variegatum*.*

* Fig. 1. Cormus of *Colchicum variegatum*, seen dorsally, the outer tunic having been removed: *a*, scar showing attachment of this cormus to that of the previous year; *b*, dorsal shoot; *c*, scar left by the flowering stem of the previous year.

Fig. 2. Cormus of *Colchicum variegatum* (dactyloid form), having its outer tunic, and seen dorsally: *a*, scar showing attachment of this cormus to that of the previous year; *e*, unguiform process of the cormus; *c*, withered base of the flowering stem of the previous autumn; the upper part of the figure shows the leafy young shoot which has just flowered, and which grows from the base of the cormus.

This figure and figure 2, show the cormi as they were seen in Paris in the first fortnight in December.

Colchicum sometimes acquires a development which is very considerable in comparison to the body of the cormus itself. We have a remarkable example in a plant of *Colchicum Balansæ*, in which this process has the form and dimensions of an index finger of usual size. It is perfectly conceivable that such cormi might have suggested the idea of the word *Hermodactylos*.

Dr. Planchon devotes the next section to a discussion of the nature of the underground organs of *Hermodactylus tuberosus* Salisb., which we shall pass over, since the plant is not known to be anywhere used in medicine. The author then sums up with the following

GENERAL CONCLUSIONS.

1. The *Hermodactylos* of the Greek physicians is generically identical with the *Hermodactylos* or *Surugen* of the Arabs, and with our officinal Hermodactyl.
2. The officinal Hermodactyl is produced, according to all probability, by *Colchicum variegatum*.
3. The properties of this cormus in a fresh state are probably very active, and may rival those of the ordinary Colchicum. They are impaired or lost by age.
4. If the botanist-physicians of the *renaissance* had recognized the generic identity of *Hermodactylos* and of our officinal Hermodactyl with ordinary Colchicum, they would not have allowed the properties of the latter, in affections of the joints, to be unnoticed until the commencement of the present century,—properties known to the Greek physicians of the sixth and seventh centuries (at least in *Colchicum variegatum*).
5. The *Hermodactylus verus* of Matthiolus (*Hermodactylus tuberosus* Salisb., *Iris tuberosa*, Linn.) cannot be considered to be the *Hermodactylos* of the Greeks, and is emphatically not our officinal Hermodactyl.
6. The *Surugen*, or long-rooted Hermodactyl of Mesue, corresponds probably to the dactyloid form of the cormus of *Colchicum variegatum*, or of some other oriental species.
7. The species of Colchicum to which Mesue's *Surugen*, having a round and white root, belongs, cannot be positively determined. It may possibly be our officinal Hermodactyl ; but the season for the collection of this *Surugen* is said to be spring, and that for our Hermodactyl should be autumn. Perhaps the species referred to, is the Egyptian Hermodactyl (*Colchicum bulbocodioides*), spoken of by Prosper Alpinus.
8. The *Surengian* of Avicenna comprehends probably different species of Colchicum.
9. *Colchicum Illyricum* is an imaginary species, whose name ought to be expunged from our catalogues.
10. The Hermodactyl of Prosper Alpinus is *Colchicum bulbocodioides* Biebst. (*C. Ægyptiacum* Boiss.)
11. The cormus of the Colchicums is the enlarged base of a branch [*est une base renflée de rameau*] analogous to the cormus [*plateau*] of *Crocus*, and to the pseudo-bulbs of certain orchids. It corresponds physiologically to certain monocotyledonous embryos ; but its relation with the embryo of *Gramineæ* is confined to mere resemblance.
12. The tubercules of *Hermodactylus tuberosus* are true axillary rhizomes, at first enveloped by the sacciform bases of their first leaves.

ON THE PREPARATION OF OXYGEN.

BY HENRY M. WITT,
Assistant-Chemist to the Government School of Applied Science.

THE only reply which I think it necessary to make to the criticism published in the last number of your Journal, by Mr. Brown, on a previous communication of mine upon the "Preparation of Oxygen," is, that before presuming to publish any remarks on the subject, I had satisfied myself that the properties observed in the "nascent oxygen" were not due to chlorine, owing to

this body having been removed by effectually washing the gas; but, to dispel all doubt on the subject, I have repeated my former experiments, with precisely the same results as recorded in my former communication.

Moreover, as an "*Experimentum Crucis*," oxygen was prepared from chromate of potash and sulphuric acid, neither of which ingredients (if pure) *contain* any *chlorine;* yet the evolved gas was found to possess the property of colouring Schönbein's ozone test papers, more strongly, perhaps, than any I have before observed; and lest there should be a trace of chloride present in the chromate of potash used, which might give rise to the production of chlorine or of chlorochromic acid, the evolved gas was passed through a Woolfe's bottle containing a strong solution of caustic potash, and then through a tall column of water, but even after this effectual washing, by which every trace of chlorine was completely removed, the power which the gas possessed of colouring the iodide of potassium test paper was not in the least degree diminished.

It might, however, be argued that chlorine when present only in a small per-centage in another gas, would even pass through caustic potash without being completely absorbed, from the part of the interior of each bubble of gas being protected from contact with the caustic alkaline solution, by the exterior portion of the bubble. Now, it would not be very easy to disprove such an argument (even if its validity be admitted) in the case of a mixture of a small proportion of chlorine with a large proportion of oxygen; but if a parallel case be taken of two other gases, under precisely similar conditions, the question may with facility be decided.

For this purpose an ordinary hydrogen generator was employed, containing granulated zinc and sulphuric acid. To this a small quantity of sulphide of iron was added, by which means a mixture was obtained of hydrogen with a small per-centage of sulphuretted hydrogen. This gas, before passing through any washing liquid, coloured paper, moistened with acetate of lead distinctly brown; but when this same gas was passed through a precisely similar Wholfe's bottle, containing caustic potash solution of the same strength as that employed in the washing of the oxygen in the former experiment, the sulphuretted hydrogen was *entirely* removed, the gas exerting no longer any action whatever upon lead-paper.

Thus, I think, sufficient evidence has been adduced satisfactorily to prove, first, That caustic potash is effectual in removing a small quantity of a gas soluble in that liquid, from a large quantity of another gas insoluble in it; and, secondly, That the peculiar properties possessed by the gas generated in the ordinary methods of preparing oxygen, especially when it is produced from bichromate of potash, are really due to the oxygen existing in a peculiarly active condition, *and not to the presence of chlorine.*

Mr. Brown must please to remember that this is a property of *nascent oxygen*, which the gas loses, probably from some molecular change, when it is kept for a certain length of time in contact with water.

Chemical Laboratory, Museum of Practical Geology.

TEST FOR CARBONATE AND IODATE OF POTASH IN IODIDE OF POTASSIUM.

BY MR. WILLIAM COPNEY.

That substances used in medicine should be absolutely pure, however desirable, is not always practicable; that they should, however, be of such a degree of purity as not to affect their uses, is imperative.

Iodide of potassium is one of those preparations which, in the present Pharmacopœia, are consigned to the list of the Materia Medica, no formula being

given in the part appropriated to "preparations and compounds," "inasmuch as"—it is stated in the preface—"we have these medicines *so* adapted to our use, that we have no occasion to prepare them ourselves;" a statement, it may be observed, somewhat refreshing after the wholesale declarations which have recently been put forth about the adulteration of drugs and chemicals.

In this notice all mention of impurities other than the above is omitted. Although the great bulk of iodide of potassium, prepared for medicinal use, is sufficiently pure to be "adapted" for medical purposes, it rarely happens that it is entirely free either from carbonate of potash or iodate of potash, or both. The manufacturer has a difficulty to perform—to produce an article not only pure, but in well-defined crystals and free from colour. A compound consisting of nothing more than iodine and potassium, united in their equivalent proportions, is not very stable in respect of colour; being somewhat hygroscopic, water as well as carbonic acid is absorbed from the air, hydriodic acid and carbonate of potash are formed, and the salt acquires a yellow tinge, a change which is the more noticeable if it be in the state of powder, in which form it is used in some establishments, having been prepared by the purification of the commercial article, the solution thus obtained being evaporated to dryness.

In purchasing the salt, although it may be always expected that the bodies before mentioned will be present, it is of course desirable to select the sample which contains them in the smallest proportion—any test which shall enable us to do this quickly and with certainty, may not be unwelcome.

The reaction on litmus paper, effervescence with a dilute acid, turbidity of the solution with chloride of barium or lime water (which, when "slight," according to the late Mr. Phillips, "need not be noticed"), and the formation of a bluish precipitate with protosulphate of iron,—indicating potash or its carbonate; and dilute hydrochloric acid for the iodate, really leave little to desire. The protosulphate of iron, although an excellent test—the most delicate of those enumerated—has not the advantage of the chemical constitution and relationship possessed by the compound now proposed—the protiodide of iron, in the form of the recently and carefully prepared Syrupus Ferri Iodidi P. L.

The usual precautions as to equal quantities and similar circumstances being observed, a drop of the syrup is to be added to each sample dissolved in distilled water; a bluish precipitate is, in most cases, formed at once, which retains this colour for some little time—the peroxidation of the iron being somewhat retarded by the small quantity of sugar present. If iodate, however, be present, the precipitate becomes red almost immediately. The samples under examination are set aside, oxidation proceeds, and the precipitates subside; the relative quantity of each is noticed and registered accordingly. If, in the use of this test, iodate is suspected, it may be subsequently shown more distinctly by means of the usual test of hydrochloric acid.

To establish the trustworthiness and value of the test now proposed, some iodide of potassium was prepared as pure as possible; to a solution of this a drop of the test was added—no change occurred, nor was there any indication of a precipitate after standing twenty-four hours. One drop of a solution, containing one grain of carbonate of potash dissolved in a thousand grains of distilled water, was now added, and a pale blue precipitate ensued. A second specimen was prepared, containing both carbonate and iodate of potash; on adding the test first a deeper blue and then a red precipitate was formed. A third, containing iodate only, was now made—the test being added, a red precipitate formed immediately.

St. Mary's Hospital.

ON THE POSITION OF ALUMINIUM IN THE THERMO-ELECTRIC SCALE.

BY GEORGE GORE, ESQ.

To determine the position of aluminium in the thermo-electric scale, I took a piece of aluminium wire, three and a half inches long and one thirty-second of an inch in diameter, connected one end of it with one end of a wire or other shaped piece of the metal to be compared with it, connected the free ends of the two pieces of metal with the mercury cups of a suitable galvanometer, and then applied heat, by means of a spirit-lamp, to the junction of the two metals; the direction of deflection of the galvanometer needles, and the corresponding direction of the thermo-electric current produced, indicated whether the particular metal under trial was thermo-electro-positive or thermo-electro-negative to aluminium; in those cases where aluminium was thermo-electro-positive to the other metal, the current of positive electricity of course proceeded from the aluminium *through the heated junction* to the other metal; but where it was thermo-electro-negative, the current of course, proceeded in the opposite direction.

The metals examined with aluminium were antimony, bismuth, zinc, cadmium, tin, lead, iron, copper, brass, german silver, silver, gold, and platinum; with the exception of antimony, bismuth, and cadmium (which were in the form of bars, about one quarter of an inch in diameter), they were nearly all of them in the form of wires, varying from one-sixtieth of an inch (in the case of platinum) to one-twentieth of an inch in diameter. The galvanometer used was a sensitive one, with a coil containing about two hundred turns of size number thirty of copper wire.

With the following metals, lead, gold, zinc, silver, brass, cadmium, copper, iron, and antimony, the current of electricity developed proceeded from the aluminium through the heated junction to the other metal, and was comparatively strong in the case of antimony, very feeble in that of lead, and intermediate in degree with the other metals enumerated; but with tin, platinum, german silver, and bismuth, the current was opposite in direction, and was extremely feeble with tin, and comparatively strong with bismuth. Aluminium was therefore thermo-electro-positive to each metal of the first of these classes, and thermo-electro-negative to each of the second class.

The order of thermo-electric capacity of metals, &c., arranged by Cumming, is as follows:—Galena, bismuth, (mercury, nickel,) platinum, palladium, (cobalt, manganese,) tin, lead, brass, rhodium, gold, copper, silver—zinc, cadmium, (charcoal, graphite,) iron, arsenic, antimony; each metal being *relatively* thermo-electro-positive to all that follow it in the scale, and negative to all that precede it. Those metals joined together by a bracket are of equal thermo-electric power.

In addition to this order of thermo-electric relation of metals, &c., the whole series have been divided into two classes, all those preceding zinc being specifically thermo-electro-positive, and all those which follow silver being thermo-electro-negative; bismuth being the most positive, and antimony the most negative.

To determine to which of these classes any particular metal belongs, we have only to take two similar pieces of the metal, connect one end of each piece respectively with the mercury cups of a suitable galvanometer, apply heat to one of the free ends, and then suddenly bring the other free and cold end upon the heated part, a feeble thermo-electric current will then be developed, which will circulate from the hot end through the junction to the cold end with thermo-electro-positive metals, and in the opposite direction with negative metals. Any metal which is relatively thermo-electro-positive to a metal which

is known to be a thermo-electro-positive one is also thermo-positive; or if negative to a known thermo-electro-negative metal is also thermo-electro-negative.

From these well-known facts, and the experiments here recorded, it is evident that aluminium is a thermo-electro-positive metal of moderate power; and its position in the thermo-electric scale lies between tin and lead, it being feebly thermo-electro-negative to the former metal, and weakly thermo-electro-positive to the latter.

Thermo-electric Scale of Metals, &c., including Aluminium.

Galena.	Cobalt.	Rhodium.	Cadmium.
Bismuth.	Manganese.	Gold.	Charcoal.
Mercury.	Tin.	Copper.	Graphite.
Nickel.	Aluminium.	Silver.	Iron.
Platinum.	Lead.	———	Arsenic.
Palladium.	Brass.	Zinc.	Antimony.

TRADE PHARMACY.

BY MR. JOSEPH INCE.

A Pharmacopœia, however diligently compiled, is always obsolete; recent discoveries, and new resulting formulæ must ever supersede it.

There are some well-meaning persons who profess implicitly to adopt it as a standard—literally to follow its directions, and recognize no other preparations than its own. It will be interesting, and not altogether uninstructive, to show, by a few familiar illustrations, how visionary is such a creed—now that the Chemist (transmuted from a salesman into a thinking being) originates, improves, and speculates, and takes no more for granted the traditional statements of his predecessors. The result is that Druggists make and Physicians order a long list of remedies unknown to the Pharmacopœia: and should a new national standard be given to the world to-morrow, the same reasons would again render it out of date; its formulæ would inevitably be outvied by the better methods suggested by manufacturing tact, and new recipes spring into existence.

An excellent opening example is furnished by Taraxacum.

John Henry Kent was a man great in his speciality; he had a share in awakening attention to the Dandelion products. Brought up originally as a carpenter, he forsook his humble occupation and aspired to Surgery, studied at St. Bartholomew's, and passed the regular examinations. He could boast the honour of having been complimented by Sir Astley Cooper on his perseverance, and he subsequently left London to become the lion of his own immediate neighbourhood. He soon turned his attention to the preparation of extracts—with what admirable success no Chemist and Druggist need be informed. His were the Proteus of extracts, for they were sold in more shapes, and bore more names than the public ever suspected. Kent's outward peculiarities are well known. The carpenter struggled with the philosopher, and the balance was not always equal. No one knew more than he how to use his materials to the best advantage, and no one knew less how to superintend the necessary details of business. Excellent manipulator as he was, many were his rivals in the field, and so large is the actual sale of Taraxacum, so extensive its medicinal employment, and so numerous are its producers, that its preparation has assumed the position of a distinct branch of trade. There exist at present all varieties of Succus and Liquor Taraxaci, Essentia Taraxaci, Extractum Taraxaci Fluidum, and simple Extract. Not only are they prescribed by Physicians of the greatest eminence, but in some instances the skilful exhibition of these remedies has established the credit of the prescriber. They are now kept by every Druggist, and are offered to the public at prices which range with the most embarrassing fluctuation, from the highest to the lowest estimate. Yet the

reputation which Taraxacum enjoys is of comparatively recent date. This valuable addition to our Pharmacy rests on its own intrinsic merits, for the Pharmacopœia gives us only two dreary formulæ, neither of which is ever used, but which, like the portraits of our remote ancestors, are gazed at with much respect, and there their influence ends.

Sumbul forms a second illustration. Not long ago a curiosity, it is now in some request. The physical characters of the root, with its musk-like odour, are too well known to need description. This remedy was introduced to the notice of the profession by Dr. Granville, and its therapeutic applications may be judged of by a remark extracted from the Doctor's pamphlet:—"Speaking, therefore, pharmaceutically, we have the following preparations of the Sumbul equally available in medicine at the discretion of the Physician. 1. The root itself masticated. 2. Its impalpable powder taken as such, or in the form of pills. 3. Its infusion in cold water. 4. Its decoction. 5. An aqueous or bitter extract. 6. An alcoholic tincture. 7. An ethereal tincture. 8. A compound tincture. Lastly, An ethereal volatile oil." In practice these are limited to two, the infusion and the tincture.

Infusum Sumbuli.

Rad. Sumbul Contus., ʒij.
Aquæ Bullientis, ℥x.
Mft. Infus. Stet horas, ij.

Tinctura Sumbuli.

Rad. Sumbuli, ʒij.
Sp. Tenuor, ℥xvj.

Macerate seven days and strain; dose from twenty to thirty minims. (The time mentioned in the case of tinctures is probably allotted on some principle, but it is generally better to substitute the word *month* for *week* in printed formulæ.)

A third illustration may be drawn from Arnica, for which we are indebted to the Homœopathists. A place is due to it amongst extra Pharmacopœial preparations, since its tincture is frequently prescribed for external use. For this there is at present no recognized formula beyond the one taken from the Prussian Pharmacopœia, published at Berlin in 1846.

Florum Arnicæ concis., ʒiss.
Sp. Vini Rectificat, ℥xij.

When the tincture is made from the flowers it has a beautiful green colour, while that made from the root is brown.

Tinctura Radicis Arnicæ.

Rad. Arnicæ, ʒiv.
Sp. Rectificat, ℥xxxij.

The Homœopathists order a compound tincture of both root and flower. The public hold Arnica in much esteem; its effects are indeed sometimes marvellous, whether used alone (properly diluted) or in combination with some other liniment. It has been recently introduced into trade circulation as Arnica Opodeldoc.

It is the fashion now-a-day to praise foreign skill at the expense of English industry, but it may be doubted whether we have not underrated our own exertions. The English Chemist may point with a degree of satisfaction to the preparations just enumerated. Taraxacum, at least, in all its forms, is much better made by us than by the best Pharmaceutists on the continent.

Thus three medicinal agents have passed into current use, all of which have gained the approval of the Physician and the confidence of the public. It is difficult, indeed, to say how far their employment has been due to the direct influence of the Profession, or to the personal activity of the Chemist. The fact of their existence is undeniable—an Imperium in Imperio; but what may be their ultimate fate—whether destined to continue as out-door worshippers, or to receive hereafter the sanction of the College, time, and the wisdom of the

Committee, must decide. Meanwhile such preparations are neither to be overlooked nor despised, for they are indications of energy acting in the right direction. The industry which strikes out new formulæ is the best guarantee for the strictest attention being paid to established recipes. In Pharmacy, as in every other pursuit, nothing is so much to be dreaded as indifference.

Descending a little lower in the scale, an amazing number of new remedies will be encountered, proving, if nothing else, the inventive bias of the times we live in. At this point the old national standard is less and less distinctly visible; the supremacy of Trade Pharmacy begins in earnest.

Here is a prescription which startled the junior mind of every junior Assistant:—

℞ Olei ligni Juniperi, ℥v.
(Destillatione siccâ l. Juniperi Phœniceæ parati.)
Axungia Recentis, ℥iss.

M. fiat unguentum.

The Pyroligneous Oil of Juniper is a mystery no longer, being used alone, or in combination, as an ointment, and lately as a Soap. Here is the original German form:—

℞ Ol. Pyrolig. Juniperi, ℥iss.
Sevi Ovilli, ℥ss.
Axung. Porci, ℥iss.

D. S. to be rubbed in at night.

Again, if the Pharmacopœia be written in the imperative mood, as is often stated at our evening meetings, what are its directions in this case?

℞ Solut. Quinæ Ammoniat, ad ℥ij.
Ætheris Chlorici, ℥j. ℈j.

M. coch ij. theæ subinde è cyatho vinoso aquæ. March 22, 1856.

The only published form for the Ammoniated Solution of Quinine is given in the *Annals of Pharmacy*, quoted in this Journal, vol. xiii., page 344, for which the following may be substituted with advantage:—

Quinæ Disulphatis, gr. xxxij.
Spirit. Tenuoris, ℥iiiss.
Spirit. Ammoniæ, ℥ss.

Mix the Quinine in the Proof Spirit and add the Ammonia. The Quinine is perfectly dissolved without any subsequent precipitation.

Chloric Ether is a trade remedy, often made thus:—

Chloroform, ℥j.
Spirit. Rectif., ad ℥viij. ♏

What also are the instructions of the Pharmacopœia when Scotland sends us this?

℞ Jalapinæ.
Aloin, āā gr. ij.

Mft. pil tales xxxvj. Sign. Jalapine Pills, one at night. August 16, 1853.

A knowledge of Trade Pharmacy could alone explain that Jalapine is a whitish powder, with a dose of from three grains to five for an adult; and that Aloin is a straw-coloured powder, dose from one to two grains, to which is attached the Johnsonian advice, that it is to be taken "as circumstances and constitution dictate." Most things are.

No few prescriptions consist entirely of substances for which there is no existing authorized form:—

℞ Liq. Cinchon. Cord. Battley, ℥j.
Ætheris Chloric, ℥j.
Aquæ ad ℥vj.

♏ sumat ℥iss. bis die. March 26, 1855.

The water is the only pharmacopœial ingredient.

The Liquor of Cinchona will recall the numerous preparations which bear the name, and are so much to the credit of the late Mr. Richard Battley, none of which perhaps is better known or more extensively used than the Liquor Opii Sedativus.

Trade Pharmacy is apparent in this prescription:—

℞ Etheris Chlorici, ℥iss.
Liquor. Magnes. Bicarb.
Fluid. Dinneford, ℨvj. Oct. 9, 1855.

Nor is it less manifest in a companion picture:—

℞ Acet. Colchici, ℥j.
Liquor. Taraxaci, ℥v.
Sodæ Carbonat, ℥j.
Solut. Magnesiæ Murray, ℨviij. March 20, 1855.

The strict follower of the Pharmacopœia would be at fault in this very ordinary recipe:—

℞ Ext. Sarzæ fluid. Comp., ℥xiv.
Liquor. Taraxaci, ℨj.
Liquor. Potass. Brandish., ℥ij.
Aquæ Destillat., ℨv. April 21, 1855.

It is no exaggeration to say, that in twenty London houses the above would be made up in twenty different ways, the distilled water being the only bond of union. Novelty, quite as much as economy, is the order of the day. Who has not noticed the marked influence that private recommendation bears on public practice? Here is a well-known specimen:—

℞ Brown's Vesicating paper, 12 inches.

A portion to be applied behind each ear at night twice a week.

Much as we admire the skill of our country Pharmaceutists, a misgiving may be entertained as to whether they would correctly dispense the following:—

℞ Cerii Nitrat gr. vj.
Acid. Nitric. dil. ℥j.
Syrup. Aurantii, ℨj.
Aquæ Rosæ, ℨij.
Aquæ Destillat, ℨiij.

♏. capiat ℨj. bis terve quotidie. Nov. 27, 1854.

Or this:—

℞ Nepenthe ♏. xv.
R. Scillæ, ℥ij.
Syrup. Limon, ℨiiss.
Vin. Ipecac. ℥j.
Mist. Amygd. ad ℨvi.

ℨj. ter die urgent. tussi.

Thanks to this Journal, the use and action of the salts of Cerium are not unknown. Nepente is neither a plant, a fish, nor a man's name (all of which theories have been entertained), but an Opium preparation, for which see the advertisement—the word itself being the trade classical expression for *νηπενθὴς*, *i. e.* "anodyne." Some attention is required to keep pace with the novelties which are constantly brought forward, such as Chloride of Strontian, Sulphate of Bebeerine, varieties of the Iron series, Salicine and Glycerine; Photographic Chemicals, Methylated Spirit, patent cure-alls, unusual and difficult combinations, Soaps and Lotions, as well as aërated waters of sufficient and uniform strength; to say nothing of the reported wonders of Materia Medica which emerge into temporary daylight, prior to regaining their final resting-place—the cupboard.

Physicians sometimes mount their own cannon, and turn them on the enemy:

℞ Pil. Aloes dil. (secundum formulam, Dr. M. Hall) gr. iv.
Ext. Hyoscyami, gr. j.

Mft. pil. h. s. s. Dec. 12, 1854.

Or they prefer old forms to new, and become in consequence mysterious:—

℞ Liq. Fowleri, s. s. l.

i. e. sine Spiritu Lavandulæ. Erasmus Wilson.

Occasionally, without being mysterious, they enter the realms of fancy:—

℞ Tinct. Lavand., ℥vj.
Tinct. Camphor, ℥ij.

The meaning is clear; yet there is no English Tincture of Lavender in existence, and there has been no Tincture of Camphor since 1836.

These remarks cannot in honesty be concluded without a reference to another branch of the subject, with which they stand in unfortunate connexion. I allude to the fancied discoveries that have recently sprung up on every side, whose only claim to public attention is the self-praise with which they are accompanied.

This advertising system is the great stumbling-block of modern Pharmacy. It creeps into the classic precincts of the Royal Institution, steals into the select circle of every scientific meeting, usurps the space better occupied by the Sydenham Trowsers, comes to this Journal an unbidden and an unwelcome guest, and, finally, bursts into full, unchecked luxuriance in the pages of the *Lancet*. Given, a medicine of repute: vary its manufacturing process; leave out of its composition a stray ingredient of secondary or no importance; disguise its colour as fancy dictates; and, lastly, call it by a Greek name; and you have the modern Panacea ready for the next advertisement. One marvel of this description has of late succeeded the other in quick succession, and nostrums of every imaginable pretension have rained down upon the astonished world of Pharmacy, "thick as the leaves in Vallombrosa." Botany has been ransacked to furnish some unheard-of Liquor, and Chemistry turned upside down, to produce an active principle in *ine*. The smaller the shop, the greater the wonders; intellect in inverse ratio to space. This is the weak, rather than the dark side of the picture; for the advertisement (becoming too expensive) is soon discontinued, and the medicinal value of the remedy ceases.

We smile at sundry of our brethren in the country for selling drugs and paint, physic and hair-brushes, pills and prayer-books, and (as I am told in confidence) red herrings; but should not the London Chemists sometimes look at home, particularly at a time when they can justly claim the highest praise for the care, the skill, and the manufacturing success exhibited in their preparations. Surely it is better to follow the example of those who have rescued Pharmacy from the hands of the incompetent and the Empiric, than to gain a questionable reputation, built on the flourish of a circular and the credulity of the simple.

31, *Southampton Street, Covent Garden.*

MANUFACTURE OF YELLOW PRUSSIATE OF POTASH, RED PRUSSIATE OF POTASH, PRUSSIAN BLUE, CYANIDE OF POTASSIUM, &c.

(*Continued from page* 424.)

Prussian Blue from Gas Liquors, &c.—Mr. Spence proceeds as follows when treating the ammoniacal liquors of the gas-works, one gallon of which requires less than a pound of sulphuric acid to saturate it. He collects the liquor in large wooden tanks or vats containing from 4000 to 5000 gallons, in which he subjects it to what he terms his first or preparatory process—viz., the conversion of the hydrocyanate or prussiate of lime, into ferro-hydrocyanate or ferro-prussiate of lime, to prevent its decomposition in the second or saturating process. This he effects in the following manner:—For every 100 gallons of the liquor he takes ten pounds of sulphate of iron and five pounds of recently slacked quick-lime, and having reduced the lime into the state of cream of lime by the addition of water, he stirs into it the solution of sulphate of iron, after which he pours the mixture into the liquor to be operated upon; the whole is then stirred for a quarter of an hour, after which it is allowed to settle for twelve hours, when it is ready for the next, or saturating process, which is conducted as follows:—On the top of an air-tight vessel of 300 gallons capacity, a stoneware receiver, containing sulphuric acid, is placed. By means of suitable taps and other arrangements, the sulphuric acid is allowed to pass into the vessel containing the liquor to be saturated until that process has been accomplished, which may be known by the liquor assuming a light green colour on the addition of a small quantity of a solution of sulphate of iron. The saturated

liquor, after filtration, is pumped up into wooden tanks or vats containing 1000 gallons each. When one of these is filled, Mr. Spence adds to it a solution of sixty pounds of sulphate of iron; a precipitate of a light green colour in a short time falls down from the liquor. The clean liquor is drawn off and run away, fresh water is added, the whole allowed to settle, and the clear liquor again run off. This is repeated until the water comes off tasteless. The precipitate is then thrown on filters and assumes the consistence of a pulp or paste. This he calls his coarse blue, and from it in this state he makes fine Prussian blue and prussiate of potash. To make Prussian blue the following process is adopted:—Fourteen pounds of common soda, or an equivalent quantity of other alkali, is dissolved in ten gallons of water, and when at a boiling heat poured on 100 lbs. of the pasty, coarse blue; the mixture is then stirred at intervals for three hours, when it is allowed to settle, the clear liquor drawn off, and the sediment thrown on a filter to drain. To every gallon of this liquor one pound of sulphate of iron is added, which throws down a dark green precipitate; muriatic acid is then added until it assumes a deep blue colour, after which the blue is washed and dried in the usual way.

In operating on the stronger ammoniacal liquors, or those one gallon of which requires one pound or more of sulphuric acid for their saturation, Mr. Spence proceeds as follows:—For every 100 gallons of ammoniacal liquor he takes a solution of six pounds of sulphate of iron in sixteen gallons of water, and to this he adds two gallons of the ammoniacal liquor; he then allows the precipitate to settle, pours off the water, and continues to add fresh until it comes off tasteless; he then adds the drained precipitate to the ammoniacal liquor to be operated upon, evaporates the whole to dryness, and reduces the dry mass to a coarse powder, from whence he obtains Prussian blue and prussiate of potash.

To make Prussian blue, fourteen pounds of common soda, or an equivalent of other suitable alkali, are dissolved in sixteen gallons of water and heated to 150° Fahr.; this solution is poured on 100 lbs. of the coarse powder above mentioned, and stirred every quarter of an hour for three hours; it is then allowed to settle, the clear liquor drawn off, and the sediment thrown on a filter and washed with six gallons of water at 150°; the filtered liquor is then added to that previously drawn off, and the whole boiled with six pounds of oxide of iron for ten minutes; the whole is then allowed to settle, when the clear liquor is drawn off, the sediment thrown on a filter and washed with two or three gallons of water; to this clear liquor is next added eight pounds of sulphate of iron previously dissolved in water, which throws down a dark green precipitate; on this is poured muriatic acid until it assumes a deep blue colour; it is then washed, filtered, and dried in the usual way.

Mr. Spence thus describes his process for treating the refuse lime after it is taken out of the gas-purifiers:—"Having put a quantity of the dry lime into a wooden vat, I let in water heated to about 150° Fahr. till the lime is thoroughly soaked and the water stands about a foot above the mass, and then it is beaten about till well broken; it is then allowed to remain, with occasional stirring, for eight hours, when it is allowed to filtrate out by a cock at the bottom of the vat. This liquor is set aside for using at once; more water is then added to the mass, is allowed to filtrate through, and is then used for another quantity of dry lime.

"To make Prussian blue from the aforesaid liquor first run off, I proceed as follows, and I bring the liquor to boil. For every 100 gallons I use twenty pounds of dry oxide of iron, allow it to boil for ten minutes, and withdraw it into a settling vessel; when settled, the liquor is drawn off. To this liquor I then add a solution of muriate of iron, as long as any precipitate is thrown down; muriatic acid is then added, until it assumes a deep colour; it is then washed, filtered, and dried in the usual manner."

Prussian Blue as prepared by the Electric Light and Colour Company.—To obtain this pigment a voltaic battery is employed, consisting of zinc plates arranged between porous diaphragms or in porous cells, and flanked on both sides by iron plates on the exterior of the diaphragms, or the zinc plate and porous cell are placed together in a cell of cast iron; or the iron may be arranged relatively to the zinc in the following manner, viz., an iron plate in a porous cell, and a zinc plate or plates or a zinc cell flanking or surrounding a porous diaphragm containing an iron plate. In either case the battery is excited by placing sulphuric acid to which has been added ferrocyanide of potassium, in contact with the zinc by any suitable arrangements; the iron plates or cells of these batteries being excited by nitrous or nitric acid, to which

is added, after the batteries have been some little time in action, also some ferrocyanide of potassium. The strength of the acid excitants are as follows:—The nitrous or nitric acid, pure, of the specific gravity of 1.200, and the sulphuric acid one part to six of water. The size of the iron and zinc cells which is preferred, is the ordinary size, or eight inches by seven for the zinc plates and ten inches by twelve for the iron cells, which may be about three inches wide and a little smaller at the bottom than the top. The porous plates or diaphragms may be of any suitable material—a well-baked pure pipe clay or unglazed porcelain being preferred.

The products of these iron and zinc batteries, excited as above described, are Prussian blue or ferro-prussiate of iron—a light blue pigment which they define as the ferro-prussiate of zinc, and which is obtained in the porous cells—nitrous fumes, nitre, sulphate of potash, and hydrogen gas. The quantity of the ferrocyanide of potassium which is used will vary, of course, with the size of the iron cells and porous cells, but in practice it is found preferable to put, for the sizes above given, about one ounce into each iron cell, and a quarter of an ounce into each porous cell. As it would not be possible to add a sufficient quantity of ferrocyanide to the excitant in the iron and zinc cells to take up all the dissolved metals which then exist as salts, the natant liquors from these cells after the working of the battery is finished receives an additional quantity of ferrocyanide, by which any further number of equivalents of the said metallic salts are precipitated as pigments of the aforesaid kinds, and the nitre and sulphate of potash are at liberty, after the proper and usual process in such cases, to crystallize out as pure salts from their mother liquors, which are principally of an acid nature.

If plates of zinc and iron ordinarily arranged as in galvanic batteries be excited by sulphuric acid alone, and then a portion of ferrocyanide of potassium be added, a splendid blue pigment will result as the product after the galvanic action has ceased; sulphate of potash will also be produced and hydrogen gas be given off simultaneously with the action of the battery.

The nitrous fumes given off in using the batteries above described as excited by nitrous as well as sulphuric acid, are economized by conveying them into a chamber where sulphur is being burnt, and there, by their agency, the sulphurous acid is converted into sulphuric acid; or they may be conveyed into a leaden chamber, which is lightly filled with wood shavings, and converted into acetic ether by admitting to them, in the chamber so prepared, the ammonia from the batteries used in preparing other pigments; the nitrous fumes may be also conveyed on to the old iron cells or plates in the presence of water, thus forming nitrate of iron, which is employed in the next form of battery.

This form of battery consists in using nitrate of iron in the following manner, as an exciting agent. To the ordinary iron cells in the Maynooth battery (that first described) nitrate of iron, prepared as above, is added, and the ordinary dilute sulphuric acid to the porous cells, which may now be made of any suitable organic substance, such as lime wood or bladder. In this form the ferrocyanide of potassium is to be added to the porous cell only. The nitrate of iron, by constantly depositing its iron, does not admit of the iron cells wearing out. The solution of nitrate of iron should be a saturated one.

Ferro-prussiate of zinc is also obtained by the use of a battery consisting of iron and zinc plates, with sea-water and other mineral waters—these being made to pour through the battery. Ferrocyanide of potassium is added as the colour-making salt.

CHEMICAL INFLUENCE OF ELECTRICITY, HEAT, AND LIGHT.

BY C. F. SCHÖNBEIN.

(*Continued from page* 370.)

Thermolysis.—This term may be applied to chemical decomposition produced by heat.

It is a remarkable fact, that of inorganic substances which are decomposed under the influence of heat, the majority are oxides ; for instance, the oxides of the noble metals, all peroxides, the acid oxides of chlorine, bromine, iodine, nitrogen, manganese, chromium, &c. Most of these substances resemble free ozonized oxygen, in producing a blue colour with guaiacum tincture, discharging the colour of indigo

solution, and in producing other phenomena of oxidation which are not produced by ordinary oxygen.

Upon these grounds I am disposed to infer that the oxygen which produces these effects is in the ozonized condition.

Then, if it be admitted that the oxides of platinum, gold, silver, mercury, &c., are compounds of the metals with ozonized oxygen, and also that the peroxides of manganese, lead, &c., are compounds whose oxygen is partly in the ordinary state and partly ozonized, and if it is true that free ozonized oxygen is converted into ordinary oxygen at a certain elevated temperature, it is possible that the immediate cause of the separation of oxygen, which takes place when these substances are heated, is the conversion of the ozonized oxygen into ordinary oxygen.

Further, if the oxides of gold, platinum, &c., are really AuO_3, PtO_2, &c.; the peroxides of manganese, lead, &c., $MnO+O$, $PbO+O$, &c.; and if these metals, or the oxides MnO, PbO, do not combine with ordinary oxygen, the conversion of ozonized oxygen in these oxides and peroxides into ordinary oxygen, by the application to them of any means which cause this conversion, would be attended by their decomposition into metal and ordinary oxygen, or into lower oxides and ordinary oxygen.

Unless the substances associated with the ozonized oxygen exert some influence upon it in regard to the temperature at which it is converted into ordinary oxygen, the conversion of combined ozonized oxygen into ordinary oxygen, would take place at the same temperature as that of the free ozonized oxygen.

The absence of such an influence would, from an *à priori* point of view, have little probability; and experiment shows that the temperature at which the evolution of oxygen, from substances which probably contain ozonized oxygen, is not in all cases the same.

But if it is really the case, that the conversion of the ozonized oxygen into ordinary oxygen requires different temperatures, according to the nature of the substances with which it is associated, it is possible that in some cases the highest temperatures that can be produced would be insufficient to effect disozonization. The peroxides of murium, bromium, iodium—chlorine, bromine, iodine—and the peroxide of iron, are not decomposed at the highest temperatures, and even hyponitric acid—NO_2+O_2—evolves oxygen only at a very high temperature.

When, however, any one of the first three peroxides is in contact with a substance which has a strong chemical affinity for the lower oxides of their radicals, the ozonized oxygen of those peroxides is converted, under the influence of heat, into ordinary oxygen, and liberated. Thus, peroxide of murium and water yield at a high temperature hydrated muriatic acid and oxygen; peroxide of murium and potash yield muriate of potash and oxygen.

I am therefore inclined to the opinion that the complete or partial thermolysis of oxygenous substances is to be attributed to the disozonization of the ozonized oxygen they contain.

It is barely necessary to remark that I am also inclined to refer the thermolysis of substances that do not contain oxygen—for example, compounds of carbon and hydrogen—to the allotropism of one or other constituent under the influence of heat.

Turpentine will serve as an example. There is little probability that the carbon of this liquid is in the same state as in charcoal. Faraday and other physicists have shown that the transparent colourless carbon constituting diamond, becomes black and opaque when strongly heated; it is, in fact, allotropized, and thus presents a character similar to the colourless transparent phosphorus, which, under the influence of heat, is converted into a red opaque substance. Now if the carbon of turpentine were in a state similar to diamond, and if this state is an essential condition of its combination with hydrogen; and further, if heat caused an allotropism of this combined carbon similar to that of the uncombined carbon, it would be liberated from turpentine as black carbon, under the influence of a sufficient temperature. The fact that all organic substances are decomposed at a high temperature, with liberation of carbon, may perhaps be connected with the capability that carbon has of assuming allotropic conditions.

Photolysis.—This term may be applied to chemical decomposition effected by light.

The number of known instances of simple photolysis is very small, but the

number of phenomena in which there is a combined influence of light and of material substance is much greater.

The substances that are subject to photolysis are, as in the case of electrolysis and of thermolysis, oxygenous in all instances, if chlorine, bromine, and iodine are regarded as oxides. Those substances which are considered by all chemists to be oxides, and which evolve oxygen under the influence of light, are such as I suppose to contain ozonized oxygen ; for example, the oxides of gold, silver, mercury, and peroxide of lead, &c.

At a subsequent opportunity I shall communicate the results of some experiments on the action of light upon substances which, according to my views, contain ozonized oxygen ; meanwhile I will merely remark that there is every reason for supposing that the number of substances decomposable by light is much greater than has hitherto been known, and that, as a general rule, light causes the liberation of oxygen from the same substances that heat does, only, as might be expected, much more slowly.

My views with regard to simple photolysis are entirely similar to those which I hold as to electrolysis and thermolysis. I assume that there may be in the case of photolysis the same twofold action — ozonization and disozonization — which is observed in the case of material substances ; thus, for example: gold, platinum, silver, and mercury, convert the ozonized oxygen of $HO+\overset{\circ}{O}$ into ordinary oxygen, while at the same time they determine oxidation by ordinary oxygen, similar to that which ozonized oxygen produces.

However little we may be able to comprehend this twofold action of the same agent, we may at least be certain that it is not the result of mere accident, and that both kinds of action are so intimately connected, that the one could not exist without the other.

It is sufficiently well known that light exercises a sensible influence upon the chemical action of oxygen. But if light is capable of causing oxygen to produce effects similar to those of ozonized oxygen, it may also be inferred that it will produce the opposite effect of converting ozonized oxygen into ordinary oxygen. I have not yet been able to obtain decisive experimental evidence of this latter action, although some of my results afford grounds for supposing that it does take place.

In the previous parts of this memoir it has been shown that the immediate cause of electrolysis, thermolysis and photolysis, is probably the assumption of an allotropic modification of one or other constituent of the substance decomposed under the influence of electricity, heat, or light ; consequently it must be inferred that the combination of elementary substances under the influence of the same agencies is likewise the result of the assumption of allotropic conditions by one or other of those substances.

1. *Electrosynthesis.*—This term may be applied to every kind of chemical combination that takes place under the influence of electric discharge.

In most, if not in all instances of electrosynthesis, one of the substances entering into combination, is oxygen. Now it has been ascertained that no elementary substance combines with ordinary oxygen at the ordinary temperature, while oxygen that has been ozonized by electric discharge combines with the greater number of elementary substances at the ordinary temperature, even with silver, and under certain conditions with nitrogen, the most indifferent, in its chemical relations, of all the elementary substances ; consequently, it appears nearly certain that the immediate cause of oxidation effected under the influence of electric discharge, consists in the conversion of ordinary oxygen into its allotropic condition.

The formation of nitric acid in Cavendish's experiment is in this respect important. Ordinary oxygen and nitrogen do not combine at any temperature, even when in contact with the most powerful bases, but, under the influence of electric discharge, they combine even in the absence of water or a base.

It might be supposed that the electric discharge induced this effect by simultaneous action upon both oxygen and nitrogen; but it would appear more probable that it is solely a consequence of the allotropic condition assumed by the oxygen. Thus, nitrate of lime is formed when a mixture of ozonized oxygen and nitrogen is shaken with lime-water, and the ozonized oxygen disappears. It has already been shown that the acid formed by slow combustion of phosphorus in air, contains a recognisable amount of nitric acid, and since under these circumstances ozonized oxygen is pro-

duced, it would seem that this nitric acid is produced by its combination with atmospheric nitrogen. Davy also observed that nitric acid is formed about the positive electrode in the electrolysis of water, containing nitrogen in solution.

All the other instances of oxidation effected by oxygen or atmospheric air under the influence of electric discharge are likewise referrible to the ozonization of oxygen as the immediate cause ; thus, the oxidation of arsenic spots upon porcelain, the conversion of lead or its oxide into peroxide, the separation of iodine from iodide, the conversion of ferrocyanide of potassium into ferricyanide, are all phenomena of this kind.

2. *Thermosynthesis.*—This term may be applied to any chemical combination effected under the influence of heat.

There can be no doubt that in many cases heat induces chemical combination by reducing or counteracting the cohesion of substances ; however, it is equally certain that in a great number of cases the influence of heat in causing combination must be of a different kind, as for example, where the combination of liquid or gaseous substances requires increase of temperature. Thus, the combination of hydrogen and oxygen takes place only at a red heat; that of sulphur and mercury at a temperature at which sulphur is viscous. In accordance with the general opinions as to the influence of heat upon the physical and chemical relations of substances, it might be expected that in such cases chemical action would rather be retarded than not, by increase of temperature.

The oxidation of phosphorus is so remarkable in its features that it may be taken as the type of direct oxidation, by means of heat. In stagnant oxygen this substance is not oxidized at the ordinary temperature. The oxidation commences at 75° F., the temperature at which the ozonization of oxygen commences ; both actions augment as the temperature rises. At 140° F. the rapid combustion takes place.

There can scarcely be any doubt that the slow combustion of phosphorus is effected by ozonized oxygen ; and the facts that at 140° F. phosphorus is rapidly oxidized; that in oxygen highly ozonized, it takes fire at the ordinary temperature ; and that it converts ordinary oxygen into ozonized oxygen more rapidly, in proportion as the temperature approaches 140° F., render it probable that the rapid combustion of phosphorus in ordinary oxygen at this temperature, is a consequence of the more rapid ozonization effected by the joint influence of phosphorus and of heat.

My experiments with amorphous phosphorus show that it does not ozonize oxygen at any temperature. It does not undergo slow combustion or rapid oxidation at 140° F., and at a higher temperature it is converted into ordinary phosphorus. These facts appear to me peculiarly significant in relation to the opinion that the thermosynthesis of phosphorus and oxygen is owing to an ozonization of the oxygen by means of the phosphorus and heat jointly.

Among the several chemical analogies between phosphorus and arsenic, is that of slow combustion, although in the case of arsenic it takes place only at a temperature of 356° or 392° F., when volatilization commences.

The vapour of ether undergoes slow combustion at 284° F., and my experiments have shown that in this case also oxygen is ozonized, as is shown by the marked oxidizing action of the ether vapour, while in this state of slow combustion. Moist iodide of potassium-paper is immediately rendered blue, sulphide of lead is converted into sulphate, linen coloured with indigo is bleached, the colours of flowers bleached by sulphurous acid are again restored, &c. Even at the ordinary temperature ether exercises a slight but sensible ozonizing influence upon oxygen.

Stibmethyl, stibæthyl, cacodyl, and similar substances take fire at the ordinary temperature in oxygen, and the experiments made by myself and Löwig show that they ozonize oxygen also.

Consequently I am disposed to the opinion that in all these cases the immediate cause of the oxidation is the assumption of the allotropic or ozonized state by the oxygen, and that this is effected more readily by the above-mentioned organic substances than by phosphorus. It would be very interesting to ascertain whether this influence would be less at very low temperatures.

3. *Photosynthesis.*—This term may be applied to any chemical combination effected by the influence of light.

Since I regard chlorine as a compound substance, I am unable to bring forward any instance of direct photosynthesis. There are, however, many compound

substances that present this phenomenon—HS, SO_2, SPb, S_3As, camphene, ether, indigo blue, guaiacum, &c.

Sulphuretted hydrogen and oxygen are converted into sulphur and water more rapidly in sun-light than in the dark; selenietted, arsenietted, and antimonietted hydrogen present the same character. There are a number of other instances of oxidation effected under the influence of sun-light, while in the dark it either does not take place, or takes place much more slowly. These phenomena of oxidation are precisely similar to those effected by ozonized oxygen in the absence of light, except that the action is rather slower. It would appear, therefore, that light exercises such an influence upon oxygen as to augment its chemical activity in the same manner as heat and electricity, and that ozonization precedes oxidation.

The remarkable absorption of a considerable amount of oxygen by camphine and ether under the influence of light, and the communication of oxidizing character to the oxygen, appears to render the above conjecture a certainty. My experiments show, that in the dark, absorption and ozonization of oxygen takes place slowly in the same way that this influence is exercised by phosphorus in the dark; but when to this influence is added that of light, the absorption and ozonization are much more rapid.—*Journal für praktische Chemie*, lxvi., 129.

APPLICATION OF SULPHURET OF CARBON.

E. Deiss states that since 1840 he has reduced the price of sulphuret of carbon from fifty to sixty francs the kilogramme, and that in 1848 he sold it at eight francs the kilogramme for the purpose of vulcanizing india-rubber. At present, with an apparatus composed of three retorts, he is able to manufacture the immense quantity of 500 kilogrammes of sulphuret of carbon in twenty-four hours; although scarcely a year ago, with the same furnace, the same retorts, and the same amount of fuel, he could only produce 150 kilogrammes in the same time. The product now costs him only fifty centimes the kilogramme, and he has no doubt that, by operating on a larger scale, it might soon be sold at forty francs per 100 kilogrammes. As however this substance has at present only a very limited employment in the vulcanization of india-rubber, the author having a large quantity on his hands, naturally desired to find some other purpose to which it might be applied; and considers that he has discovered one of the greatest importance, namely, the extraction of fatty matters.

He states that Paris daily produces 30,000 kilogrammes of bones, which are collected by the *chiffonniers*, and carried to the manufactories of ivory-black and gelatine. Here they are sorted, some being devoted to the production of ivory-black, others of gelatine, while some are sold to the workers in bone. The greater part of them (25,000 kilogrms. daily) is employed in the manufacture of ivory-black; and undergo a preliminary treatment for the extraction of their fatty matter. The bones are broken and boiled with water for about three hours in large cauldrons; the fat floats on the surface and is skimmed off; the bones are taken and thrown into a heap, to undergo a kind of fermentation, in which the production of heat induces a state of desiccation which fits the bones for calcination.

In the operations the bone undergoes a great alteration: the long boiling in water dissolves a great portion of the gelatine, which is necessary for the production of a good black; and the fermentation and long exposure to the air causes the almost total destruction of the animal matter, so that a bad black is produced for the sake of only five or six per cent. of fat.

The author states that much more advantageous results may be obtained by the employment of sulphuret of carbon. He proposes to crush the bones almost to powder; then to treat them with this agent, which almost instantly dissolves all the grease contained in them; and from this it may be separated by distillation, which is greatly facilitated by the low temperature at which this fluid boils, and the ease with which it may be condensed. The quantity of grease thus obtained is ten or twelve per cent., and it is superior to that procured by boiling.

He adds, that the same agent may be applied to the extraction of oils from oleaginous seeds and of the grease from wool. In the latter case the grease extracted becomes a useful product; it is a butyraceous substance, adapted for the manufacture of some kinds of soap.—*Comptes Rendus*, February 4, 1856, p. 207.

VALUATION OF CHLORIDE OF LIME BY MEANS OF SULPHATE OF IRON.

Wittstein and Claude have made some comparative experiments on the valuation of bleaching powder, and have come to the conclusion that the reaction with sulphate of iron is not capable of affording accurate results. This reaction is supposed to be—

(1.) $CaO+ClO$ and $4\ (FeO+SO_3) = CaCl$ and $2\ (Fe_2O_3+2\ SO_3)$.

However, in making the experiment, there is always an evolution of chlorine, even before the whole of the protoxide of iron is converted into peroxide. Moreover, by comparing the results obtained by the valuation with sulphate of iron and those obtained with arsenious acid, the latter always give a higher per-centage.

The evolution of chlorine is owing to the reaction being of the following nature :

(2.) $CaO+ClO + 2\ (FeO+SO_3) = Ca\ O+SO_3 + Fe_2O_3\ SO_3+Cl$.

Supposing that the chlorine were at once completely evolved, seventy-eight parts of sulphate of iron would correspond with twenty of available chlorine. This, however, is not the case, because the liberated chlorine does not escape entirely from the solution so long as protosulphate of iron is present, but abstracts iron forming perchloride.

(3.) $6\ FeO + 3\ Cl = 2\ Fe_2O_3 + Fe_2Cl_3$.

The smaller the quantity of chloride of lime that comes in contact with the sulphate of iron in a given time, the more perfect is the conversion of this liberated chlorine into perchloride of iron, but towards the end of the experiment there is always an escape of chlorine, because the quantity of protoxide of iron is then very small.

It follows, therefore, that although a given quantity of chloride of lime will oxidize much more protosalt of iron than is supposed to be the case in the equation (2), still it is impossible to oxidize four equivalents by means of one equivalent of hypochlorite. It is obvious that the loss of chlorine which takes place in this manner, varies according to the circumstances of the experiment.—*Vierteljahresschrift für Prakt. Pharmacie*, iv., 555.

NEUTRAL NITRATE OF MERCURY.

The observations with regard to this substance are contradictory: it is generally described in chemical works as uncrystallizable, and that by evaporation a syrupy mass is obtained, having the composition $HgO,NO_5 + 2$ Ho.

Millon states that by evaporation over sulphuric acid, crystals are formed, the composition of which is represented by the formula $2\ (HgO\ NO_5) + HO$.

Regnault states that a concentrated solution of the salt, placed in a freezing mixture, gives crystals.

H. S. Ditten has analysed the substance obtained by this latter method at a temperature of 5° F., and finds its composition to be—

	Mean results.			Calculation.
HgO	45.50	1	108	..... 46.15
NO_5	22.50	1	54	..... 23.08
HO	31.41	8	72	..... 30.77
	99.41		234	100.00

which may be represented by the formula $HgO, NO_5 + 8$ HO.

The crystals are rhombic plates, the angle of the prism being about 67°. When the temperature rises to 15° F., the crystals melt, and colourless acicular crystals soon separate from the liquid. They become white and opaque by exposure to air. By the addition of water they become white, and not yellow like other salts of the oxide of mercury. Their composition is—

	Mean results.			Calculation.
HgO	72.82	2	216	..... 72.73
NO_5	18.03	1	54	..... 18.18
HO.....	9.15	3	27	..... 9.09
	100.00		297	100.00

which may be represented by the formula $2\ HgO, NO_5 + 3$ HO.—*Das Chem. Laborat. d. Univ. Christiana, &c.*, p. 80.

MAMMOTH TREE OF CALIFORNIA.

During the past summer this enormous tree was exhibited at the Crystal Palace, New York. That portion of it (the third and fourth sections) now in this country may be seen at the Philharmonic Rooms, Newman Street, where we have had an opportunity of examining this curiosity of the vegetable kingdom. It is one of a group of ninety-two trees, inhabiting a solitary district on the elevated slopes of the Sierra Nevada. From an examination of the rings on the trunk, it has been supposed to be about three thousand years old. The following are its dimensions:—

Whole height of tree	363 feet
Height to first limb	140 "
Diameter at base	31 "
Diameter 100 feet from base.....	15 "
Bark at base.....18 inches in thickness.	
Bark removed to the height of 116 feet.	

The forest is thus described in *Hooker's Journal of Botany* for April:—

"This gigantic forest is situated in a small valley at the source of one of the tributaries of the Calaveras River, Calaveras County, California. Arriving at Murphy's by one of the daily line of stages, either from Sacramento City or Stockton, or by the Sonora Coach, the traveller finds himself within fifteen miles of this celebrated grove. Here animals or vehicles can be procured at all times, and at reasonable rates. Leaving Murphy's by an excellent carriage-road, and gradually ascending, winding through a splendid forest of pines, cedars, and firs, with occasional oaks, often catching a glimpse of the adjacent pine-clad mountains, the Mammoth Tree Hotel is reached in two and a half or three hours. Here the proprietors, Messrs. Lapham and Haynes, offer every accommodation to parties, visitors, or boarders, at reasonable charges, it being their aim to make the Grove a fashionable and popular place of resort. The valley in which these trees are found contains about one hundred and sixty acres of land, and it is estimated to be four thousand feet above the level of the sea. The distance from Sacramento City by the stage route is ninety-five miles, and from Stockton eighty-five miles.

"Ninety-two trees of this species are now standing, and are all found within an area of fifty acres of the valley. They are evidently a gigantic species of cedar, as is indicated by the growth, bark, and leaf; according to botanists, however, they belong to the family of *Taxodiums*, and have been justly named *Washingtonia gigantea*, and are beyond doubt the most stupendous vegetable products upon earth. They were discovered early in 1850 by hunters, whose accounts were considered fabulous until confirmed by actual measurement."

ALCOHOL FROM THE FRUIT OF THE CACTUS.

A new branch of industry has lately been established in Sardinia, by the production of alcohol from the cactus, or Indian fig, which grows wild with remarkable luxuriance in every part of the country. The fruit was sometimes used by the poor for food, but more generally for feeding pigs; its price was about sevenpence a hundredweight.—*Augs. Allgem. Zeitung*, 288, October, 1855.

GLYCERINE JELLY.

There is no published formula for the article sold under this name, but in answer to many inquiries on the subject, we insert the following formula, by which a preparation exactly similar in appearance and effect is made:—

℞ Saponis Mollis, P. L. ℥ss.
Mellis Purif., f. ℥ij.
Ol. Olivæ pallid., ℥v.
Perfume, ad libitum.

First intimately mix the soap with the honey, then gradually add the oil, stirring without intermission until all the oil is taken up. Care must be taken not to add the oil too fast.

A correspondent has sent the following formula:—

Powdered gum arabic, ½oz., syrup, 4oz., made in the proportion of 3oz. of sugar

to 1 oz. of water, the yolks of three eggs, olive oil, 4 oz., glycerine, 2 oz.; rub the gum and the syrup well together, then add the yolks of eggs, and when well mixed, add gradually the oil and glycerine, previously mixed together.

ACCIDENTAL POISONING BY ACONITE.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—Adverting to the case of accidental poisoning by aconite, reported in the *Pharmaceutical Journal* for the present month, I beg leave to correct the misstatement, that the fatal mistake referred to occurred "in the shop of an apothecary in Newry," as neither Connor nor his assistants are legally qualified to practise as Apothecaries in Ireland.

Requesting you will give this a place in your next number,

I remain, Sir, your obedient servant,

Apothecaries' Hall, Dublin,
April 18th, 1856.

C. H. Leet,
Secretary to the Court of Examiners.

TEST FOR STRYCHNINE.

Mr. J. W. Slater, Analytical Chemist, Sheffield, in a letter to the *Times*, March 26, proposes the following test for the detection of strychnine :—"A few drops of pure sulphuric acid are mixed with an equal bulk of water and allowed to cool. Chlorate of potash, in fine powder, is then added, and the suspected substance introduced. If strychnine be present, an intense maroon red colour appears, gradually fading into a rose-violet. In principle this process agrees with the ordinary test, but the materials used are much less capable of producing any varied play of colours."

SELECT COMMITTEE ON ADULTERATION OF FOOD, DRUGS, &c.

April 2.—Mr. Thomas Wakley, editor of the *Lancet*, stated that very early in life his attention was directed to the subject of adulteration. He said, "I was articled as pupil to an apothecary and druggist in Somersetshire, about A.D. 1810 or 1812. A practice was carried on in that house which struck me as being of a very awful character. We had a small wholesale department, and the chief business of that department was to send adulterated drugs to a wholesale house in London. I recollect among other things we sent in large quantities, of verdigris, white precipitate, a preparation called burnt sponge, and annatto. The practice of the house was peculiar; the drugs sold over the counter retail and for prescriptions, were always of first-rate quality, so far as I could judge ; but the articles sent to London were certainly very vile fabrications. The preparation called burnt sponge, consisted of two pounds prepared charcoal, and six ounces of common salt. The verdigris consisted of sulphate of copper with a little acetate of lead dissolved in water and mixed with it. The annatto consisted of annatto half-a-pound, turmeric three ounces, lime three ounces, soft soap ten ounces. When flag annatto was not to be had, an additional quantity of turmeric with some red colour was put in." This and other information had been confirmed lately by a fellow-apprentice now residing at Islington, from whose memoranda some of the formulæ were taken. Witness said, "I believe that the quality of the adulteration practised has not deteriorated, but that the quantity has immensely increased. I am afraid that adulterations which were of a very partial nature have now become generally diffused, and, in fact, striking at the very morality of our commercial operations." Mr. Accum's "Death in the Pot" appeared about 1826, and by making known that these adulterations could be practised without means being taken for their prevention, the evil was likely to attain an enormous magnitude. If the Committee were to close the inquiry and no legislation should follow, the evil would be increased to a degree which would be absolutely frightful, every dishonest tradesman being now informed as to the tricks which can be resorted to. A general wish prevails among tradesmen to

conduct their business honestly, but the competition drives many to extremes. The best course to diminish the evil, would be the adoption of some means to lead to publicity, whether in case of conviction or merely examination. The Excise would do more good if publicity were given to their proceedings. A moderate expenditure might be attended with success. For example, the power might be entrusted to the General Board of Health to employ officers to make purchases, examine the goods of various persons, and publish the names, whether guilty of adulteration or not. The honest trader should have the credit, and the dishonest should be exposed, the names published outside police-stations, town-halls, school-houses, &c. Such publicity, even without a penalty, would effect much good. The inspectors should have power of entry at all times into the houses of tradesmen. Small penalties might be inflicted in cases of injurious adulteration, with imprisonment after three or four convictions. The Analytical Sanitary Commission caused many enemies, but no prosecution resulted from it, although one was commenced but soon compromised. Many tradesmen expressed a hope that the exposure would lead to an improvement in the trade, and were therefore reconciled to it. The examination of goods purchased might be entrusted to the medical officers of the Board of Health in London, and of local boards in the country. Witness said, "I have been calculating that I could myself put down adulteration in London if I had the requisite power under the law, at an expense of £10,000 a year. I form that opinion from what has been done by the private Commission which I instituted." Witness explained in detail the course of proceeding adopted by the Commission, and entered into some particulars respecting the proposed inspection, the power of appeal, and the jurisdiction over the parties whose goods might be examined. All articles should be sold under their proper names. Chicory might be mixed with coffee and sold as a mixture, but not as coffee. Gelatine should be sold as such, but not under the name of Isinglass. Some advantage might arise from an annual licence of Chemists and Druggists. Great improvement had taken place since the establishment of the Pharmaceutical Society.—Jacob Bell stated that he had given much attention to the subject, especially since 1841, when the Pharmaceutical Society was established. He quoted a general description of the nature of the adulterations and sources of inferiority in drugs, from a paper by himself, read at a meeting of the Society, in December, 1841 (*Pharmaceutical Journal*, vol. i., No. 6). A distinction should be made between fraudulent adulteration and the sale of articles of second or third quality, at a corresponding price. The "Illustrations of the State of Pharmacy in England," published in the *Pharmaceutical Journal* of 1842 and 3 (on a plan similar to the *Lancet* Commission, avoiding personalities), had enlightened the Chemists on the subject of many of the most important defects in the quality of drugs and chemicals. Considerable improvement had taken place since that time. Instances of adulteration with tests of purity were continually discussed at meetings of the Society. In consequence of such publicity, pure milk of sulphur, which it was formerly very difficult to procure, was now generally sold. Oxide of zinc, senna, scammony, opium, and many other medicines, had also greatly improved in quality. Experience proved that the supply is regulated by the demand. When a demand for pure drugs exists, the supply soon comes as a natural consequence. If the demand be for that which is cheap, the same rule applies, and articles are manufactured to any price. Scammony, for example, is mixed with chalk and flour, the per-centage depending on the price. A distinction should be made between three sources of impurity in medicines:—Firstly, A fraud by the intentional substitution of one substance for another, or its mixture with another; secondly, The sale of articles which are injured by keeping, which results from carelessness chiefly; thirdly, The want of skill in the manufacture of an article. Many extracts may be quite genuine, but inferior to others, for want of attention to some details in the manipulation or the degree of heat employed, or from the process adopted being such as to yield the largest product by the sacrifice of high quality. In regard to imperfections arising from this latter cause, want of skill in the manufacture, the public should be left to take care of themselves. In the first and second classes, where intentional fraud or culpable negligence could be proved, it might be proper that some easy and summary mode of punishment should exist. But in such case it should be clearly proved that the vendor had a guilty knowledge of the fact. In the selection of drugs much skill and experience are required. A person might be mistaken, for example, as to the quality of a sample of bark or opium. When

reduced to powder, the difficulty of detection is increased. The practice of sending fourteen pounds of a drug to the mill, and receiving twenty-eight pounds or more of the powder in return, was formerly said to prevail, but had become obsolete. In many cases confidence must be placed in the vendor, where the means of analysis are difficult or practically impossible, as in the case of vegetable substances. No education is required by law for a chemist. A man may be a shoemaker to-day, a chemist to-morrow; but he is not allowed to assume the name of Pharmaceutical Chemist or Member of the Pharmaceutical Society, unless legally registered. The Society always considered the attempt to put a stop to fraud in drugs useless, as long as any person, however ignorant, was allowed to deal in them, and no provision was made for the education of that class of persons. Those who are qualified are so voluntarily, not by compulsion. There are many qualified Pharmaceutical Chemists, and the number is increasing. Witness alluded to the law in France, Germany, &c. In answer to a question respecting a restriction on the sale of poisons, he thought the only safeguard the public could have is, that the chemist should always label the article "Poison;" that he should never sell certain poisons, except to persons who understand the use of them; and, if to be taken inwardly, he should have a prescription or order from a medical man. The use of square bottles or coloured labels, as a mode of distinguishing poisons, would increase the evil, because the rule could not be made universal, and it would therefore give a false idea of security, leading to the supposition that everything in round bottles and with other labels might be taken with impunity. The word *Poison* on a label is the best security. It would be impossible to draw the line between a poison and a drug not of that class, as most drugs are poison in certain doses. On the continent, a list of poisons is, in some places, adopted, and certain restrictions imposed. In 1847, the College of Pharmacy in New York memorialised the Legislature in favour of a law to prevent the importation of adulterated or worthless drugs. About the same time, the Pharmaceutical Society in this country memorialised the Secretary of State, praying for the passing of a Pharmacy Act. In America the result was a law, published in the *Pharmaceutical Journal*, vol. viii., No. 3. The result of the application to the Home Office was a polite reception, nothing more, which was a frequent occurrence. Large quantities of adulterated drugs and chemicals were stopped at the ports in America and condemned by the examiners. Such regulations tend to check a certain class of fraud. No law will ever prevent fraud and adulteration altogether. All that can be done is to suit the remedy to the nature of the case when it occurs. When one law is evaded, another should be contrived. The endeavour of the chemists in America to improve the character and qualification of their body have been, to some extent, successful. They and the English chemists have corresponded, and mutually stimulated each other. There could be no objection to a licence for chemists and druggists. There is a licence which is a great nuisance, the patent medicine licence. That is a very absurd thing; if it were removed, the chemists would not object to a licence of a more reasonable character. The kind of law for the suppression of adulteration would require much consideration. The power of inspection of shops possessed by the College of Physicians is very limited and rarely exercised. The greatest safeguard to the public would be improved education of Pharmaceutical Chemists, to raise their position, and teach them that it is their interest as well as their duty to sell the best medicines they can get. A great improvement in this respect is daily taking place. The respectable chemists would be glad to assist in any means that might be proposed for checking the evils in question. The Pharmaceutical Society would officially consider any bill, if referred to them, and would, without doubt, give practical suggestions. Considerable difficulty exists in reference to the prohibition of the importation of inferior drugs, as some—opium, for example—may be valuable for manufacturing purposes, for the extraction of their elementary principles, and yet be unfit for use in the state imported. The rage for cheap medicines does not apply to quack medicines, because they are sold at a fixed price, and people are willing to pay more for the mystery of a secret nostrum; but if a box of quack pills could be had at any price from 2*s.* 9*d.* down to 1*s.*, according to quality, many persons would buy the cheap sort. Very little has been elicited from the Committee which was not known by the Pharmaceutical Chemists many years ago. The Transactions of the Society contain most of the important facts, spread over a period of nearly sixteen years, which are now brought out as something new. There has been much ex-

aggeration in the evidence of some of the witnesses, and an attempt to alarm the public, which is needless and mischievous. The co-operation of the Legislature with respectable men in the different trades may be useful, as honest men are glad to combine together to protect themselves and the public against the evil practices of rogues. The same principle of honesty and policy applies equally to drugs and food.

W. B. Carpenter, M.D., stated that he had given much attention to the question of adulteration, in reference to sanitary legislation. He thought much of the adulteration of food results from ignorance; pickles, for example, are often ignorantly adulterated. Alum in bread is very injurious—had found it in crystals, and crunched it between his teeth. The effect of frequent use of alum is to produce constipation and injure the stomach, and it is taken into the blood. The excessive mortality in London and large towns arises from various causes, but the frequent costiveness of patients may be attributed to alum. Alum is added chiefly to inferior flour. The law against its use is not enforced because no one takes the trouble. The public have a prejudice in favour of white bread rather than brown. Witness had been employed with the late Dr. Pereira and Dr. Taylor to examine sugar purified by Scoffern's patent with acetate of lead. It was proved that enough lead was retained in the sugar to make it unwholesome, and the process has been discontinued. Witness had been consulted by Government respecting the mixture of chicory and coffee, and recommended such mixture to be permitted, the distinction being made known to the purchasers. The addition of about one-eighth of chicory is an improvement. The only practicable mode of checking adulteration would be Government inspection. There would be some difficulty in carrying out the plan suggested by Mr. Wakley. It would have some effect certainly, but the parties employed must be educated for the duty. With the existing machinery of the Excise, aided by a few Chemists to examine samples, much might be done at little cost. The fact being known would deter many persons from fraud. There is much difficulty in the examination of some substances. Some of Dr. Hassall's reports are rather questionable, although undertaken with good intentions. The number of analyses he published per week could not have been made by one or by half a dozen persons. In one case he had been in error in stating that vinegar was adulterated with sulphuric acid when the quantity merely represented the sulphates in the water. He was also mistaken in a sample of chocolate, and the *Lancet* Commission paid £120 to Messrs. Fry to compromise it. No action was actually brought in that and many other cases, because the parties could not prove special damages, though there might be real damage. The inspection in the case of food might be vested in the Board of Inland Revenue, drugs being a distinct question. The public should be protected against any adulteration injurious to health, or the sale of things under false names. The process of law should be easy, and conducted by the inspectors, under proper regulations.

Mr. Joseph Woodin, tea-dealer, about five years manager of the "Co-operative Central Agency," the object of which was to enable the public to buy wholesale and supply themselves retail with genuine goods, soon after his appointment supplied a chest of the finest green tea to some of the association. They complained of the quality, and produced a sample of the kind they wanted, which on examination proved to be spurious tea coloured, which could be bought at 1*s.* 3*d.* per pound, while the other kind cost wholesale 3*s.* 1*d.* It was sometimes difficult to sell the genuine tea, as people were accustomed to the spurious. The Chinese know the difference, and so does the British merchant and tea-dealer, but the parties imposed upon are the consumers. Witness gave some statistics of the quantity of tea imported, with the proportion of rubbish mixed with it—showing that, on a moderate computation, the sum of £568,050 is paid annually for that which is absolutely worthless, and even injurious to health. Some improvement has taken place lately, the exposure having had some good effect. Witness explained in detail some technicalities respecting the manufacture of tea, the mode of colouring it, and its importation; also, some particulars respecting chicory and coffee, and the controversy on the subject.

Mr. W. Atkinson, wholesale druggist, wished to contradict some exaggerated statements made by former witnesses. Commenced business in 1819, having drug mills as well as wholesale business. At that time the 4 per cent. system prevailed. All drugs sent to be ground were assumed to lose 4 per cent., and whether the

loss was more or less they were sent back in powder with the same deduction. In some cases the loss by drying, &c., was 10 or 12 per cent., the quantity was therefore made up by some harmless powder. The system having been exposed some years ago, was gradually discontinued. In 1848 Professor Redwood applied to witness for information on the subject, and published a paper in the Transactions of the Pharmaceutical Society for that year, showing the mode of proceeding and the per-centage of loss on various drugs, namely, 7, 8, 12, 15½ per cent., &c. This statement was quite correct; under the 4 per cent. system the quantity would be made up with lignum vitæ or some other inert woody fibre. Sawdust is used for cleaning the mills but not to mix with powders. Witness referred to the evidence of Mr. Warington, to the effect that the Society of Apothecaries were obliged to erect a drug mill, for even when they sent a man to the drug mill to superintend the grinding of their drugs, he was taken down to dinner or to lunch, or something of that kind, and all kinds of tricks were played with the drugs. From a small work containing a history of the Apothecaries' Company, and published in 1823, it appears that they had drug mills at that time. Therefore the evidence of Mr. Warington must have referred to an earlier period, and probably before he was born. Such statements, unless explained, might deceive the public, and do great injustice. Many very absurd and exaggerated statements have been made before the Committee. Witness explained the nature of the compound horse powders, which he said did not form a part of his business, but were used chiefly for mixing stronger medicines. Their use is discouraged by Druggists generally, but it is difficult to put an end to a long-established custom. The inspection of drug mills would not be objected to by honest men, except that they would prefer being trusted. It would be difficult to control the importation of drugs, but some advantage would arise from a system of inspection and an Analytical Board. Medicines of very good quality may be had by those who wish for them. The different qualities are in accordance with the demand of different classes, according to price.

April 9th.—Mr. James Drew, wholesale druggist, could safely lay his hand upon his breast, and say that no adulteration ever took place in his house, and he firmly believed there were other men in the trade as honest as he believed himself to be. Many of the alleged cases of adulteration were exaggerated or incorrect. In some cases they could not be done—in others, the absence of motive was a practical refutation. For example : pure annatto could not be mixed with turmeric. It is quite impossible to mix the one with the other. The price also being nearly the same, nothing would be gained by such mixture. The adulteration of East Indian arrow-root with tapioca is also out of the question, as tapioca is often dearer, and does not resemble arrow-root. It is surprising that such evidence could be given before a respectable Committee of the House of Commons, because it is so easily contradicted. It was also stated by Dr. Hassall that cinnamon was adulterated with cassia. At one time cassia was the dearer of the two. A few months ago cassia was scarce, and inferior cinnamon was sold as cassia. Witness did not believe cayenne to be adulterated by the druggists. It may have been by the pickle houses, who sometimes sell it at a very low price, as well as other things. It is extremely difficult to deal with the evidence, as witnesses do not state whether they refer to articles as imported or in the prepared state. The adulteration of ipecacuanha with chalk is an impossible case. The microscope would easily detect the mixture of wood with jalap. Many of the cases spoken of as adulteration arose from the articles being injured by keeping. As much care is requisite in keeping drugs as in their selection. The Pharmaceutical Society has caused a good deal of inquiry on these subjects. "Was not the Pharmaceutical Society established notoriously to elevate the character of the chemists ?" "No." "Have they not taken a great deal of trouble to promote purity of drugs by a new system of grinding ?" "No ; I do not know that they interfered." "You do not think that the establishment of the Pharmaceutical Society has tended in any degree to prevent the adulteration of drugs ?" "I do not think it has." "It appears in evidence that such has been the effect ?" "It is contrary to the evidence I am about to give you on another point, which I think will render the subject very clear to the Committee." Witness proceeded to contravert some of the evidence of other witnesses, affirming that the mode of adulteration described was very improbable, and founded on conjecture by persons having no practical knowledge. The addition of rice to curry powder is not an adulteration. In some formulæ it is one of the ingredients. The adulteration

of ginger with turmeric would answer no purpose, but make a bad-looking compound. The same might be said of some other modes of adulteration. Witness had heard some statements about Turkey rhubarb in that room, and had repeated them on 'Change; they were received with the utmost derision. In reference to the quantity of English rhubarb said to be used, it ought to be stated how much was sent to America, and how much was bought by the Irish poor law unions. English rhubarb is used in some of the London hospitals. It is very inferior in its effect to the foreign. Witness did not believe that adulteration prevails in the wholesale drug trade generally. There may be instances, indicated by the low price at which drugs are sometimes offered; and some drugs are imported in a very bad or mixed state. The inspection of imported drugs in America has not been successful. Drugs refused at one port have been let in at another, the question of quality being a matter of opinion with each inspector. Messrs. Maclean, Maris, and Co., confirm the impression that the inspection has failed. It is very difficult to find qualified inspectors; an experienced tradesman is fitter for that duty than a philosopher. (In answer to the question whether any great improvement had taken place in America since the inspection,) "I have only one means of judging of that, namely, by what they send us from America. We look very narrowly indeed at what comes from America. I myself would not buy any article coming into the market from America." Professors of Pharmacy are not so well acquainted with drugs as persons engaged in a regular trade. The inspection of shops by the College of Physicians might be of some use, but is very seldom done. The fact of an inspection existing would be a wholesome check. Witness corrected a statement of Dr. Neligan, about some scammony, said to have been obtained at his house, but which on inquiry was found to have been obtained at another house thirteen years ago, showing how erroneous impressions may be created by random statements. He also commented on the evidence respecting the Apothecaries' Company buying their goods in the market; the fact being that they buy them second-hand of the wholesale druggists. A small duty on drugs imported might to some extent serve as a protection of the public. Some restriction on the sale of secret or quack medicines might be useful, but no law of that kind would prevent all abuses. In France, in spite of the law, a vast quantity of spurious English patent medicines are sold. Great injury is done to the public health by the sale of quack medicines. There are practical difficulties in the way of their prohibition, and the law respecting them requires much consideration. They might be placed under regulations similar to patent inventions. The question as to writing prescriptions in English would be better answered by the retail chemists. The subject of vegetable chemistry requires further investigation. There is at present much doubt and uncertainty as to the sources of many drugs. The assistance of scientific chemists and botanists would be of great use.

Mr. Edward Divett, M.P., gave evidence on the subject of tea, chiefly with reference to the "lie tea" and other modes of adulteration, which had come under his knowledge.

Mr. Julian Rodgers, analytical chemist, stated that he had examined a great variety of articles, and found them much adulterated. He had given much attention to bread and beer. In a number of samples of bread lately examined, from the first quality to the worst, he found alum in all. Had seen bad effects in families from the bread, which, on changing the bread, had ceased. Medicine was of no avail, until the bread containing alum was discontinued. Rice-flour is much used in bread, as it absorbs water and increases profit. The quantity of alum generally used in bread by respectable bakers is very small: six or eight ounces to a batch of 116 loaves. It causes the loaves to divide more readily, but the chief object is to make inferior flour available for bread. The existence of crystals in bread would depend on the way in which the alum was introduced—whether in powder or solution. Witness had paid much attention to the examination of beer, and had reason to believe cocculus indicus and other intoxicating ingredients were used to a great extent, causing the beer to appear weak at first but to produce a stupefying effect after a time, without affording any nourishment. It is used for no other purpose than adulterating beer, and is sold openly to brewers, druggists, and others, sometimes under the name of "multum." Another name occasionally used is "hard mixture." The restrictions likely to be useful in the sale of poisons, would be prohibiting any person from selling poison, unless the purchaser be with a

witness known to the vendor, and also mixing the poison with some colour, so as to give evidence of what it is. Poisoning by educated poisoners could not be prevented. Some harmless substances, which may be had in any quantity, may by an easy process be converted into poison ; and some poisons, such as arsenic, which it might be difficult to get in a small quantity, may be purchased by the ton. Oil of bitter almonds should only be sold as an essence. The best safeguard against poisoning is facility of detection. This is obstructed to some extent by the very small fee given to medical men at inquests—namely, one guinea, with an extra guinea for the *post mortem* examination; and though the examination or analysis may occupy a week or more, no additional fee is given. A written order from a medical man to the chemist where poison is bought, might answer the same purpose as a witness.

Mr. Edwin Wickham, brewer, said the adulteration of beer generally takes place in the cellars of the publicans, not in the breweries. In some small breweries quassiæ and gentian might occasionally be used, but not to any great extent. The usual mixture for a barrel of porter (36 gallons) is 8 gallons of water, 6lb. of sugar, 1 lb. of gelatine (or patent size), a handful of common salt, extract of gentian or quassiæ to restore the flavour, sulphate of ammonia to bring back its colour, half an ounce of sulphate of iron if required to taste oldish, and 1 oz. of roach alum. Witness did not believe cocculus indicus to be much used in beer. The Excise officers might stop most of the adulteration by frequently visiting the publicans' cellars. Their chief object is to get a money fine when they can; their object is more to protect the revenue than the public health.

John A. Wise, M.P., said he had been in communication with authorities in Spain, and it had come to his knowledge, that in consequence of the quantity of adulterated articles imported, the subject was investigated, and a law was passed creating a Council of Health to attend to the question of food and drugs. At all the first-class custom-houses in Spain there are two inspectors of drugs, who are doctors or professors of Pharmacy, by whom all drugs and chemicals are examined. If found adulterated or under false names, or likely to injure health, they are ordered to be destroyed, subject to the authority of the Council of Health. None but duly licensed Apothecaries are allowed to dispense medicines, and they may not compound medicines without a prescription. Prescriptions are to be written in the native language, without contractions or erasure, sign, or symbol. Apothecaries are not allowed to dispense quack medicines, or to administer a larger dose than is recognized, without special authority of the prescriber. All secret medicines are prohibited, and patents for their sale abrogated. Any person objecting to divulge the formula of a medicine must submit the same to the Royal Academy of Medicine, who, after examination, report, and fix the recompense to be given to the inventor. If he accept the amount the formula is made public.

Adjourned to April 16th. The further report is deferred.

We are requested to correct an error in the report of Mr. Lindsey Blyth's evidence, from which it was made to appear that he held the office of Analytical Chemist to St. Mary's Hospital. His evidence related to a time when he was resident dispenser, in which capacity it was his duty to examine drugs when sent in. That office is now filled by Mr. W. Copney.

We are also requested by Mr. Baiss to insert a correction of his evidence, which was erroneously reported in the newspapers. Mr. Baiss contradicted the statement made by some other witnesses, to the effect that it is the custom for wholesale houses to make up the loss on drugs ground by adding some inert powder, and he quoted from his mill book several quantities, showing the per-centage of loss on different drugs, which tended to confirm the statement of Mr. Atkinson on this subject. He protested against the misrepresentations which had been made respecting the compound powders (gentian and others), which he said were not to his knowledge used for any purpose but for cattle medicines. He also exposed the absurdity of some of the alleged modes of adulterating essential oils, which could be so easily detected, that it would be an insult to send such compounds to any customer. While repudiating the exaggerated and erroneous statements of some witnesses, Mr. Baiss maintained that any kind of fraud actually prevalent should be exposed, whether perpetrated abroad or in this country, and that it was only by especial care and honesty in conducting business, that Chemists could remove the ill-effect which might be produced by the misrepresentations circulated under the name of evidence given before that Committee.

DRUGGISTS' EARLY CLOSING ASSOCIATION, GLASGOW.

The annual soirée of this Association took place April 16, in the Gallery of the Scottish Exhibition Rooms, Bath Street. There was a large and respectable attendance, comprising many of the fair sex. The chair was taken at half-past nine o'clock by W. Murdoch, Esq., who was supported by Messrs. Hugh Hart, and Donald Campbell; Dr. T. D. Buchanan, Professor Morton, Dr. Connall, Dr. Tannahill; Henry Cooper, Esq., Surgeon; and Messrs. Fraser, M'Call, Dryborough, &c., Druggists.

An excellent service of tea was provided, after which the chairman addressed the meeting. He felt much gratified in promoting the praiseworthy object they had in view—that of assisting the apprentices and assistants of Chemists and Druggists to obtain the privilege of leaving their places of daily toil at an earlier hour, and thus giving them the opportunity of prosecuting those studies so essential to the efficient discharge of their duties. It was the opinion of the promoters of this movement, that the shops might be closed at eight o'clock P.M., but he thought it would be better to begin by closing at half-past eight, and so gradually to prepare the public for the change.

The chairman's speech was followed by an anthem, after which Mr. H. Hart made some observations on "Early Closing and Sabbath Labour." He alluded to the evils arising from the late hours to which business was protracted. With respect to the opening of dispensing establishments on Sundays, he thought that as confectionary was the article principally sold on that day, it would be sufficient if the shops were open for two hours in the morning and one hour in the afternoon.

Mr. D. Campbell made some remarks on the drug trade, comparing its past with its present condition, and showing the improvement that had taken place. He dwelt on the advantages of the study of Natural History, more particularly of Materia Medica, Botany, and Chemistry.

The chairman having made a few concluding remarks, the meeting broke up.

BOOKS RECEIVED.

On the Manufactures of Price's Patent Candle Company. A Lecture delivered before the Society of Arts, by G. F. Wilson, F.R.S.; with an Account of the Introduction and some of the Uses of Glycerine. London: W. H. Smith and Son, Strand, 1856.

Reply to Baron Liebig's Principles of Agricultural Chemistry. By J. B. Lawes, F.R.S., F.C.S.; and Dr. J. H. Gilbert, F.C.S. London: Printed by Clowes and Sons, 1855.

On the Production of Fresh-Water from Sea-Water. By Dr. A. Normandy.

On Poisoning by the Root of Aconitum Napellus. By F. W. Headland, M.D., &c.

The Adulteration of Food and Drinks. Published at the request of the Halifax Literary and Philosophical Society. By William Alexander, M.D., &c. &c. London: Longman and Co. Halifax: W. Nicholson, 1856.

The Hospital System of London. London: Printed by W. Davy and Son, Gilbert Street, Oxford Street, 1856.

Observations addressed at the last Anniversary to the President and Fellows of the Royal Society, after the Delivery of the Medals. By Charles Babbage, Esq., F.R.S. London: John Murray, Albemarle Street, 1856.

TO CORRESPONDENTS.

Phœnix (Sunderland).—*Oxy-hydrogen blowpipe.* There is no danger of explosion, provided the proper precautions are used. It is usual to make the mixed gases pass through a brass tube about four inches in length, and filled with fine brass wire.

J. T. (Aylesbury).—We know of no better method of silvering pills than moistening the surface slightly with mucilage, and then shaking them in a box with silver leaf.

A Student (Evesham).—Babington's *Manual of Botany*, 10*s.* 6*d.*, published by Van Voorst, Paternoster Row.

Jacques.—Emplastrum Galbani.

F. E. R. B. (Stoke-upon-Trent).—(1.) The iodide of potassium is decomposed in the mixture alluded to. This, however, is not considered as an objection by some

medical men.—(2.) Yes.—(3.) *Chrome-alum.* One part of bicromate of potash is dissolved in two parts of sulphuric acid, diluted with a quantity of water sufficient to prevent the solution from depositing crystals at ordinary temperatures; the whole is then gradually added to a quantity of alcohol contained in a vessel which is surrounded with cold water, to prevent too great a rise of temperature. A considerable portion of the chrome-alum is at once precipitated in the form of a crystalline meal. The mother-liquid is then mixed with $\frac{1}{7}$ of its weight of nitric acid, to prevent the formation of the green modification; evaporated in a water-bath to $\frac{1}{4}$ its weight; and, lastly, treated with an equal weight of alcohol, and set aside to crystallize.—*Gmelin.*

M. P. S. (London).—Spirit of wine may be sold by Chemists without a licence, for medicinal use only.

E. E. (Weymouth).—*Seidlitz Spring.* Brande gives the following as its composition:—Carb. Magnesia, 2.5; Carb. Lime, 0.8; Sulphate Magnesia, 180.; Sulphate Lime, 5.; Murate Magnesia, 4.5 parts in one pint imperial.—*Bergmann.*

T. A. C. (Rochdale).—(1.) *Bandoline*, vol. iii., page 94.—(2.) Filtering through charcoal might remove the colour.

Y. Z. (Windsor).—No Chemist would think of using *Sulphur Precipitatum* for "washed sulphur."

F. A. F. (Lincoln).—The soaps alluded to could not be well made on a small scale.

S. T. M. (Ipswich).—*Tinctura Quinæ Composita.* The *whole* of the quinine is not taken up, but we have found that in the course of a few days a very small portion remains undissolved.

A Country Chemist (Pershore).—Hardwick's *Photographic Chemistry*, or the *Photographic Journal*, would give all the information required.

Alpha (Lisson Grove).—*Iodized Collodion*, see vol. xiv., page 144.

A. G. L. (Sheffield).—*Inks.* Vol. vii., page 183.

A. P. S. (Newington Causeway).—*Black stain for wood.* See page 120 of the present volume.

J. A. (Hastings).—*Sealing-wax.* A great variety of recipes for the above will be found in Beasley's *Druggists' Receipt Book.*

A. B. C. (Exeter).—*Vinegar Plant.* A full description will be found in the 2nd vol. of the *Cottage Gardener* (1849). Some interesting papers by Pereira "On the Microscopic Vegetations developed in Pharmaceutical Liquids," will be found in the 7th vol. of this Journal, pages 337, 370, and 426.

P. (Lambeth).—(1 and 2.) We have no experience in the subjects referred to.—(3.) Page 336 of the present volume.—(4.) We cannot answer the question.—(5.) No.—(6.) Yes.

J. R. (Totnes).—Professor Callan, of Maynooth, would give the information respecting the best method of coating tin plates with an alloy, as suggested by himself.

P. A. Y. (York) should read the conditions required of those who may compete for the Botanical Prize, published in our last number.

A. H. (Sunderland).—A person fraudulently using or exhibiting any title or sign, implying that he is a Member of the Pharmaceutical Society, is liable to a penalty.

The author of three letters from Sunderland should write to the Secretary, with his name and address.

A Correspondent (Plymouth) takes exception to the establishment of a proprietary right by Messrs. Savory and Moore to preparations which only require to be made carefully and of uniform strength, considering it an infringement of the principles which it is the object of the Pharmaceutical Society to maintain. He thinks such preparations, if worthy of notice, should be brought before the Pharmacopœia Committee, and while disclaiming any wish to pirate the private property of individuals, regrets to observe the patronage of secret remedies by such high authority. [We confess our inability to answer or rebut the above.]

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place.

THE PHARMACEUTICAL JOURNAL.

VOL. XV.—No. XII.—JUNE 1st, 1856.

ILLEGAL WEIGHTS.

At a Court of Burgesses, held in the City of Westminster, on Thursday, the 8th of May, the decision on the case reported in the last number of the *Pharmaceutical Journal*, was pronounced in the following terms:—

"That it is the opinion of the Court, that the weights used by Chemists must be tested and stamped, according to the standard of weights in use in Westminster, from one grain upwards: That as the question is now presented to the Court for the first time, it is their opinion that the fines already imposed upon Chemists, should not be enforced: That the Chemists are required to get their weights stamped within three months from this judgment, after which they will be liable to have fines imposed on them, if found using unstamped weights."

In our report of the case last month, we gave the titles of three Acts of Parliament relating to weights and measures, reserving the explanation of the exact state of the law in reference to the question at issue until after the decision of the Court on the subject. The three Acts above referred to are of a general application, except in places having local Acts, comprising regulations on this among other subjects.

The first local Act which we have to notice is the 29th George II., cap. xxv. (A.D. 1756), entitled "An Act for appointing a sufficient Number of Constables for the Service of the City and Liberty of Westminster; and to compel proper Persons to take upon them the Office of Jurymen, to present Nuisances and other Offences within the said City and Liberty."

The tenth section provides for the appointment of an annoyance jury, consisting of householders and traders residing in the several parishes of Westminster, not exceeding forty-eight in number, of whom one or more shall be nominated out of each of the said parishes. The persons so appointed are required to take oath in terms prescribed, and are liable to a penalty for refusal to serve, or for neglect of duty. The term of office is twelve months, after which the same parties are not again liable to serve for three years. It is the duty of this jury to take cognizance of bad or defective pavement and other nuisances; and, by the fourteenth section, they are authorized, at all seasonable times in the daytime, to enter into any shop, house, or warehouse within the said city and liberty, belonging to any person or persons that deal by weight or measure; and if the said jury shall find any weight, balance, or measure to be unlawful or defective, it shall and may be lawful for the said jury, and they are hereby required and directed to break and destroy the same, and to amerce the person or persons so offending in such sum or sums of money as they shall think proper, according to the nature of the offence, not exceeding forty shillings for any one offence.

In the following year (1757) an Act was passed, entitled "An Act to explain, amend, and render more effectual an Act passed in the twenty-ninth year of the reign of his present Majesty, intituled *An Act for appointing a sufficient number of Constables for the Service of the City and Liberty of* Westminster; *and to compel proper Persons to take upon them the Office of Jurymen, to present Nuisances or other offences within the said City and Liberty.*"—(Geo. II., cap. xvii.)

The ninth section enacts, that for obviating a doubt which had arisen upon the construction of the former Act, all weights and measures made use of by persons dealing by weight or measure within the said city and liberty, shall be

signed and sealed by the standards belonging to the said city, and also marked with a portcullis by the officer already appointed for that purpose, or by such officer as may hereafter be appointed, &c. The said officer to receive for his pains and trouble therein the fees following, and no more, that is to say:—for every bushel, 4*d.*; for every half-bushel, 2*d.*; for every peck, half-peck, and quarter-peck, 1*d.*; for all half-pecks or quarter-pecks, per dozen, 10*d.*; for every sack, 2*d.*; for every ale and beer measure, ¼*d.*; for every hundredweight, 4*d.*; for every half-hundredweight, 2*d.*; for all pound weights and all other weights under half-hundredweights, ½*d.*; for all ounce weights and all other weights under a pound, ¼*d.*; and all weights and measures belonging to persons dealing by weight or measure within the said city and liberty which shall not be sealed and marked in the manner before directed, shall be deemed unlawful.

Although this law was passed in the year 1757, it appears that the question of stamping grain weights used by Chemists in dispensing medicines has been raised for the first time in 1856. The natural inference from this circumstance is, that it was not the intention of the Legislature to interfere with such weights, and although the provisions of the Act for stamping and inspecting weights and measures are general, and apply to all persons who deal by weight or measure within the city and liberty of Westminster, the obvious intention of the Act was to simply prevent fraud in the sale of commodities. In the use of grain weights for dispensing prescriptions, fraud is not apprehended, for whether these weights happen to be a fraction of a grain below the standard or not, the Chemist would receive the same amount for a box of pills or mixture, and the question between him and his customer has reference to scientific skill and accuracy, a matter not coming under the cognizance of the annoyance jury. Such, at all events, has, during ninety-nine years been the interpretation of the law which has been generally received and acted upon in the city of Westminster, and there is no reason to believe that inaccuracy in the weights has resulted from this laxity in regard to fractions of a scruple. The question is simply a struggle between the scalemaker and the stamper of the weights, the former being desirous to save, the latter wishing to get, the fee for stamping.

Henceforth, all Chemists residing in the several parishes comprised in the city and liberty of Westminster, must have their weights from one grain upwards stamped with the Westminster portcullis, and it is the duty of the scalemaker who furnishes the weights, to comply with the requirements of the law in this respect. It might appear at first sight that this clears up all doubt and difficulty, and that the only inconvenience consists in the payment of the additional sum of about 2*d.* per set of grain weights for the expense of stamping. But it is not so. The Chemist sells weights to his customers, and, although he may reside in Westminster, his customer may reside elsewhere—for example, in Marylebone—where the inspection of weights and measures is regulated by the 35th Geo. III., cap. 73, entitled "An Act for repealing several Acts made in the 8th, 10th, 13th, and 15th years of the Reign of his present Majesty, for regulating the Nightly Watch and Beadles, and for paving, repairing, cleansing, and lighting the parish of St. Marylebone, in the county of Middlesex, and for the better Relief and Maintenance of the Poor thereof, and for divers other purposes therein mentioned, and for making more effectual Provision for those Purposes." This Act makes provision for the appointment by the vestry of an annoyance jury, similar in general terms to the corresponding provisions of the Westminster local Act. The persons eligible for such appointment are not, as in the other case, described as "householders and traders," but simply "inhabitants, being householders." This defect in the Marylebone Act has led to inconvenience, when the appointment was made by pricking a jury list with a brad-awl, some of the persons pricked being quite unsuited for the office. For example: several of the parties were gentlemen out of business, having no experience in weights and measures. In one

instance a poet was pricked and appointed, and was almost driven mad by the annoyance of continual summonses, while professionally occupied, to attend with his fellow-jurymen on their perambulations, a task for which he was quite incompetent. This and other anomalies led to the discontinuance of the custom of pricking for annoyance jury, and the selection is now made by the aid of some of the parochial officers, in a manner not generally understood, and not very easily explained. In Marylebone there is no provision for stamping the weights, and a resident in that borough in purchasing a set of weights of a Chemist in Westminster, may not desire to have the portcullis, with the extra charge for stamping the same. He may wish to have weights such as are legal in Marylebone at Marylebone price, and the Chemist in Westminster who complies with this demand, is in danger of a penalty in case the weights ordered by his customer should be found on his premises by the Westminster annoyance jury. A different jurisdiction also prevails in the City and in other places having local Acts.

PASSING EVENTS.

The close of our Fifteenth Volume reminds us of various changes brought about in the lapse of time. It would have been more in accordance with the usual custom of periodicals, and therefore more convenient, for the volume to terminate with the year, but this Journal having been commenced in July, 1841, the same date has been adhered to in succeeding years.

The Anniversary of the Society corresponds with that of the Journal, the report of the Annual Meeting in May being contained in the last number of the volume. During the last fifteen years, many of the founders and original supporters of the Society have departed this life, others have retired from business, and ceased to take a part in the proceedings. Young men, formerly students in the School of Pharmacy, have risen to the position of Examiners or Members of Council, and each succeeding year throws more responsibility on the junior Members, on whose energy and fidelity to the trust will depend the future prosperity of the institution. Various degrees of apathy or excitement have prevailed during the rise and progress of the Society, and almost every point of the Pharmaceutical barometer, from "stormy" to "set fair," has been indicated at the Annual Meetings. The last Anniversary was decidedly a mild one. It was the first occasion of meeting since the favourable settlement of the "casus belli" which had caused a temporary interruption of the proceedings of the Society, consequently there was no excitement, a small attendance, and very little to talk about.

The Illumination to commemorate the restoration of peace is appropriate at the present time, and it was decided that a star should shine on the house of the Society.

The Adulteration of Food and Drugs having furnished materials for a thick blue book, the Parliamentary Committee has closed its labours, and the report will shortly be before the public. In another part of this number we have given a short abstract of the remaining portion of the evidence. Some correspondence has taken place between Dr. Normandy and the baker, each disputing the veracity of the other, and leaving the public to form an opinion on the merits of the case. It will be observed that several of the witnesses flatly contradict each other on some rather important points, relating to the general practice of adulteration in certain trades. It is probable that the report of the Committee will be accompanied by some proposition for legislative interference; but on this subject no positive information has yet been made public.

The Ovation to Dr. Hassall, on Tuesday, the 15th of May, took place at the

Freemasons' Tavern. Lord William Lennox took the chair, and was supported by Mr. Olivera, M.P., and several medical and clerical gentlemen, with a convivial party of personal friends. The usual toasts, especially the toast of the evening, were drunk with the usual enthusiasm, and the testimonial was presented with an appropriate address by the chairman, who took occasion to compliment the indomitable courage of Mr. Wakley in carrying out the Analytical Sanitary Commission. The testimonial is described as a beautiful work of art, designed from Milton's *Paradise Lost* by the Rev. G. M. Browne, M.A., representing the angel Ithuriel clad in armour, touching with his spear Satan, who, having assumed the shape of a toad, sat close to the ear of Eve tempting her. The pedestal is adorned with the microscope and other apparatus in basso-relievo, and has an appropriate inscription. After the present had been duly acknowledged and the health of the chairman drunk, Dr. Hassall proposed the health of Mr. Wakley, who, in returning thanks, said he had for once enjoyed unadulterated pleasure; and he took occasion to express his regret at the temporary estrangement between himself and Dr. Hassall, which he said was a mere "lovers' quarrel." He further said that he had attended the festival for the express purpose of bearing his testimony to Dr. Hassall's inflexible integrity and brilliant abilities, assuring him that his slanderers should not assail him unjustly. So memorable a reconciliation has not taken place since the day when Pilot and Herod were made friends together. We understand a new crusade is in contemplation. By some mismanagement Mr. Wakley has not yet received his testimonial, and his "indomitable courage" will again be put to the test by the publication of libels against small tradesmen who, whether innocent or guilty, have no power to defend themselves against such attacks, for reasons which we have already pointed out.

Palmer's Trial is the subject which has of late chiefly engaged the public attention. A more important case to the toxicologist has not occurred for many years, and it will furnish materials for discussion in the medical journals for some time to come. We have not given any report of the case in this number, as the trial had not concluded in time even if our space had admitted of it; but we intend to place on record next month an abstract of that portion of the evidence which is interesting in a scientific point of view, and which may be useful for future reference. A complete report, comprising the circumstantial details of the slippery proceedings of a gang of blacklegs would be out of place in this Journal, and could serve no good purpose anywhere, unless as a warning and as furnishing materials for humiliating reflection on the depravity of human nature. But it is sufficiently humiliating to read some of the professional evidence, and to see science and truth decked in fancy dresses, and so disguised as to be available on either side, according to the weight of the retainer which turns the scale. It may be difficult to divest the mind of prejudice, and to avoid leaning towards the side from which the instructions are received. In the legal profession the ends of justice are balanced between the advocates, each being at liberty *per fas et nefas*, to get a verdict if he can. The more ugly the case (within certain limits) the greater the renown acquired by a victory. This licence, however, may be indulged in to a disgraceful extent, and if it should transpire that such has been the case, even a legal advocate may outwit himself, and acquire notoriety at the expense of character. But there is a wide difference between the functions of an advocate and those of a witness. No licence is granted to the witness to deviate from the strict meaning of the words "the truth, the whole truth, and nothing but the truth;" and there is no class of witnesses in whom an adherence to this rule is more important than it is in those who are called upon to give evidence on abstruse matters of science, not generally understood by the public, and therefore requiring to be stated in the clearest manner, divested as much as possible from technicalities. A scientific witness, with his head full of hard words

and abstract theories, may mystify judge and jury, and defeat the ends of justice by a pedantic display of his knowledge and an ingenious suggestion of possibilities which may or may not be foreign to the question at issue. Those whom it is his duty to inform with regard to matters of fact, being unable to follow him in his theoretical flights, and not understanding the drift of the argument, are likely to attribute importance to that which may have been suggested merely to lead them on the wrong scent. We have on several occasions pointed out this abuse of power, on trials in which chemical witnesses were arrayed against each other, and the court confused with conflicting statements, irrelevant or irreconcilable. These remarks do not apply generally to the witnesses in Palmer's trial. Some of those to whom they are applicable have already been commented upon, and the scientific evidence will be further scrutinized by the profession. As this case will be cited on future occasions, it is important that the facts should be sifted by impartial authorities, and the truth satisfactorily established. The prisoner is not the only party concerned, but future verdicts will be affected by the decision on some of the questions at issue. It was truly remarked by the Attorney-General, that if it be taken for granted that strychnia had not been administered because it had not been found in the body, this doctrine would enable many a guilty man to escape, who, by administering the smallest quantity necessary to destroy life, might prevent its detection in the stomach. It was admitted by witnesses on both sides that the portion of the poison which kills is absorbed in the blood, and it is, therefore, only the excess over and above the fatal dose which would be found in the stomach. It must be obvious to any impartial person who considers the evidence respecting the *post-mortem* examination, that the mode in which it was conducted, and the condition in which the portions of the body were sent for analysis, were most unfavourable for the elucidation of the truth. The stomach, instead of being carefully removed with its contents, was cut from one end to the other, the contents taken out and said to have been afterwards thrown into a jar containing intestines and other portions and contents of the body. Whether the whole of the contents of the stomach, or only a portion or none at all, were thrown into the jar, may admit of some doubt, as the statements on the subject are rather confused. Moreover, the party interested in the suppression of evidence was present, and was rather officious in his interference with the proceedings: he was not then an object of definite suspicion, and was not watched so closely as he would have been if this had been the case. Under these circumstances, with this confused mass of materials, Dr. Taylor commenced his investigation. Although strychnia had been mentioned to him among other poisons which the prisoner had in his possession, the circumstantial evidence forming the principal ground of suspicion with regard to that poison had not then transpired. He found the tissues of the body saturated with antimony. This unusual circumstance led him to pursue his experiments in that direction, and he gave evidence accordingly at the inquest. After he had given his evidence, other witnesses were called, who described the symptoms under which the deceased had died, with other facts relating to the behaviour of the prisoner, and the administration of medicine. Upon this the conviction on his mind was irresistible that strychnia must have been the cause of death, and he gave his opinion to that effect, as the result of the evidence which he had heard. He afterwards renewed his investigation with the remaining portion of materials with reference to strychnia, and experimented on several animals to obtain confirmatory results. But the process for detecting antimony would destroy the materials experimented on, so far as relates to the chance of detecting an organic poison, such as strychnia. Those portions, therefore, which had been so dealt with were no longer available; and if they had contained any amount of strychnia, the evidence was lost. In the materials that remained no strychnia was found; but this proves nothing. It neither

proves that no strychnia was administered, nor does it imply neglect or incompetence in the chemical examination.

It would appear from the statements of some of the witnesses that a revolution has taken place in the science of Chemistry in regard to the detection of strychnia. It was the generally-received opinion that the detection of vegetable poisons of this class was attended with considerable difficulty, when mixed with the contents of the stomach and other matters existing in the body. The tests for strychnia, when pure, are as delicate as those for arsenic or any other poison, but it has always been understood, and is stated in all works on the subject, that the difficulty of isolation from extraneous matters greatly perplexes the Chemist, and may lead to negative results even when the poison is known to be present in notable quantity. We are now told by some of the witnesses in this case, that however minute the quantity, however contaminated with the tissues or contents of the body, they could have detected it. We are told that after a lapse of weeks, or even months, the poison may still be found in the body; that it exists in the blood and in the tissues; that the failure of detection, even if less than a grain had been administered, could only arise from some defect in the process. One of the witnesses for the defence incautiously remarked out of Court that he had no doubt as to the cause of death, but "Dr. Taylor had not gone the right way to work to find the poison;" and, on cross examination, the remark was brought home to him in Court. Another witness on the same side was "proving so much," that, we are told, the prisoner became alarmed, and requested that he might be taken down, as he was damaging the case. No less impolitic was the endeavour to account for the symptoms by wild theories about mental excitement on winning a race, apoplexy, epilepsy, bilious disorder, syphilis, convulsions with tetanic complications, &c. Lord Campbell, in summing up, said, "It is in my opinion indispensable to the administration of justice, that a witness should not be turned into an advocate, nor an advocate into a witness. You must say, gentlemen, whether some of those who were called for the prisoner belonged to the category I have described—that of a witness becoming an advocate." The most experienced professional witnesses, men whose opinion has the stamp of authority, said, without hesitation, that they were acquainted with no form of natural disease to which the symptoms described could be attributed, and that these symptoms were precisely those which follow the administration of strychnia.

Fortunately for the ends of justice, the chain of evidence was sufficiently conclusive without the confirmation of the presence of strychnia in the body. The prisoner's circumstances were desperate—instant ruin stared him in the face; he was involved with Cook and others in bets, bill transactions, and forgeries; there seemed no escape except by poisoning somebody: he was officious in giving Cook medicine, which was in several cases followed by vomiting; he bought strychnia twice, administered two doses of pills, which were followed by symptoms resembling nothing but the effects of strychnia. The breath had scarcely left his friend's body when he was detected searching his pockets. The betting-book vanished—money which Cook had the day before, also vanished. The prisoner who had no money the day before was suddenly in funds. Again, his conduct at the inquest—the bribe of £10 offered to the postboy if he would upset the fly with the jar of materials for analysis—the tampering with the Coroner, and interception of letters at the Post-office—the detection of antimony in the body, and numerous minor incidents completed the chain of evidence sufficiently to remove all doubt as to the guilt of the prisoner.

There never was a case more ably and carefully got up, both on the part of the Crown and on that of the defence. The trial occupied twelve days, and no circumstance was overlooked or disregarded which could by possibility assist in promoting the ends of justice.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

CONVERSAZIONE.

On Tuesday evening, the 20th of May, the day preceding that of the Anniversary Meeting, the Conversazione usually given on such occasions by the Council, was held at the house of the Society, and was very well attended by Members and their friends, many of whom contributed to the interest of the evening by exhibiting objects of professional or scientific interest.

The Council were indebted—

To the Royal Botanical Society in the Regent's Park, for specimens of wax flowers, skeleton flowers and leaves, lace bark, rice paper and drawings on ditto, fruit of the bread-tree, wild and cultivated, &c., &c.

To Mr. Daniel Hanbury, for specimens of pela or Chinese insect-wax, on a branch of the wax-tree, together with the commercial wax; scammony root, and scammony in the shell; Brazilian clove bark; a vase exhibiting ancient Chinese enamel painting; Chinese pestles and mortars, &c., &c.

To Mr. Goodall, for his patent drug-grinding machine, with recent improvements.

To Mr. Tennant, for a collection of diamonds, fine specimens of malachite, crystallized gold and palladium, fine crystal of calc spar, ammonites, &c., &c.

To Mr. Huskisson, for a collection of sea-weed, kelp, and other products illustrating the manufacture of iodine as conducted on the coast of Ireland; fine crystals of bicarbonate of potash and sulphate of potash.

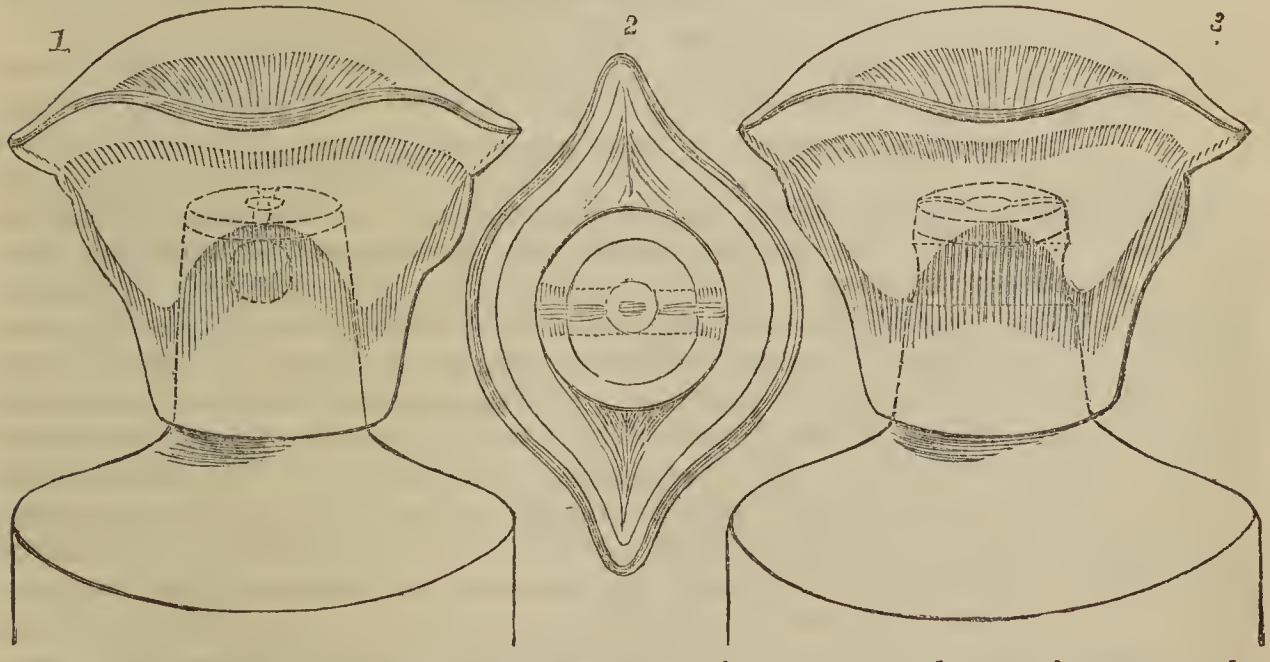
To Mr. Kernott, of Naples, for a very interesting collection of specimens of lava from the last eruption of Mount Vesuvius, in May, 1855.

To Mr. Alfred Allchin, for his leech conservatory, with recent improvements.

To Mr. Hains, for an aquarium, with artificial sea-water.

To Mr. Morson, for fine specimens of crystallized bismuth, gallic acid strychnine, aconitine, sulphate of morphia, &c., &c.

To Mr. Toogood, for a new form of stoppered bottle.



The cap, which answers the purpose of a stopper, is so constructed as to close or open the aperture of the bottle, according to the position in which it is placed, which may be understood by reference to the cut. Fig. 2 shows a horizontal section of the cap, which is elongated in one direction, and compressed in the other. Fig. 1 represents the cap so placed on the bottle as to close the orifice. Fig. 2 shows it with the bottle turned round, so that the orifice is opposite the projecting part of the cap, which enables the liquid to flow out, while air is admitted at the orifice on the opposite side of the neck of the bottle. In filling the bottle the cap is placed as in Fig. 3, and the liquid poured in. It is then turned as in Fig. 1, and effectually closed.

To Mr. Braithwaite, for some new salts of chromium with organic acids.

To Mr. Davenport, and Messrs. Cox and Gould, for specimens of chemicals.

To Messrs. McCulloch and Squire, for a specimen of the Cistus Creticus, the plant yielding laudanum.

To Messrs. Hopkin and Williams, for a large bar of aluminium, a piece of the same metal showing the fracture, also in sheet and in wire, and a specimen of kryolite.

To Mr. Appold, for pieces of aluminium and silver, of the same form and size, showing their relative weights.

To Mr. Oertling, for a set of aluminium weights.

To Mr. Murray, for a plate electrical machine, in which hardened India-rubber is used in place of glass.

To Messrs. Watkins and Hill, for a model of a steam-boat fitted with the new disc engine.

To Messrs. Mayo and Watson, for specimens of their new valved soda-water bottles.

To Mr. Pellischer and Mr. Ladd, for microscopes mounted with objects.

To Mr. Mercer, of Liverpool, for a microscopical photograph.

To Mr. Jacob Bell, for stereoscopes with views taken at the Orthopædic Hospital, illustrating the results of operations on distorted limbs.

To Mr. George Knight, for a stand of cosmoramic stereoscopes, also some photographs taken by the dry collodion process, and an improved Normandy's lamp.

To Mr. Claudet, Mr. Kilburn, Mr. Williams, Mr. Mayall, Messrs. Westley and Carpenter, and Mr. Davenport, for a variety of photographs and stereoscopes.

To Mr. Coffey, for a variety of ingenious arrangements relating to practical pharmacy. These comprised a working model of his new patented apparatus for effecting evaporation at low temperatures by blowing warm dry air through the evaporating liquid; the Esculapian still; a new form of pump acting without valves, and consisting of a piece of India-rubber tubing; patent syphons and gauges; and a dispensing counter fitted up with steam apparatus.

FIFTEENTH ANNIVERSARY OF THE PHARMACEUTICAL SOCIETY.

MR. J. T. DAVENPORT, PRESIDENT, IN THE CHAIR.

The President, before calling on the Secretary to read the Annual Report, congratulated the Members on the favourable circumstances under which they met to commemorate the Fifteenth Anniversary. The advanced position, increased public recognition, and improved educational status of the Pharmaceutical body, had been the result of the well-directed labours of the Society, and afforded encouragement to persevere. He also referred with satisfaction to the favourable decision of the courts of law on the vexatious questions at issue between the Council and one of its Members on a technicality in the construction of the Act, which need never have been raised, and which, if the decision had been adverse, would have been instrumental in seriously injuring a valuable institution. Fortunately, the unanimous voice of the learned judges was in favour of the Society, fully sanctioned the course which the Council had adopted under legal advice, and confirmed the interpretation of the law under which they had acted. This result of the proceedings having stamped the Act of Parliament and the Charter with increased authority, and vested the executive power in the Society, it would be incumbent on them to exercise that important trust with discretion and efficiency. The expense incurred in these legal proceedings, although much to be regretted, would not be likely to occur again, as

the question at issue had been so completely settled, as to demonstrate the folly and recklessness of such attacks.

The Council being now at liberty to attend to the objects for which the Society was established, would be able more effectually to advance the art and science of Pharmacy, to promote facilities for acquiring knowledge, protect the rights of the Members, and cultivate harmony and a disposition to co-operate for the general good.

The prizes offered by the Council for essays on subjects connected with practical pharmacy would not only promote scientific study, but be of service to the Pharmacopœia Committee, by eliciting information respecting formulæ and preparations in that work, which he hoped ere long would be comprised in one volume for the United Kingdom. The botanical prize offered to students under twenty-one years of age originated with the late President, Mr. Deane, and would be calculated to stimulate them to exertion in branches of study and research, a mental training of great importance to the pharmaceutist. It should be observed that the herbarium was not to be restricted to medicinal herbs, but might comprise any indigenous plants found in the locality. The President expressed a hope that the Members would afford every possible facility to their apprentices for so desirable an object. Before leaving the subject of education he wished to pay a tribute of respect to the Professors of the School of Pharmacy, Messrs. Redwood and Bentley, who had spared no efforts to make their lectures and instruction co-extensive with the increased requirements of the age, and the practical responsibilities of the Pharmaceutical Chemist. He earnestly advised the students to avail themselves of the advantages thus afforded, and carefully to avoid the ordinary temptations incident to the assembling of young men, as dissipation and the habit of pleasure-seeking unfit the mind for study, and sooner or later end in disappointment or disgrace.

The Medical Bill recently introduced into the House of Commons was duly considered by the Council, and if interference had been necessary in defence of the rights and privileges of the Members, the requisite steps would have been taken. The privilege of using methylated spirit, duty free, for certain purposes, would be highly advantageous to the manufacturing chemist, by enabling him, with better prospect of success, to compete with the continental chemists.

The increased facility of obtaining aluminium would be of service to science, as well as to the public; and although the metal could not be said to be a novelty, its recent application to several purposes, such as balances, dials, and apparatus, entitled it to notice. The supply of the material from which it is obtained being inexhaustible, a more economical mode of isolating the metal would, in all probability, be discovered, in which case it would be valuable for culinary utensils and other purposes, for which it is adapted from its property of resisting the ordinary action of oxidizing agents.

The President, in conclusion, observed how forcibly each discovery in science displays the creative power and wisdom with which all things are made, and the perfection of their adaptation to the purposes intended. The science of Chemistry furnishes innumerable illustrations of this wisdom and skill. The composition of the air we breathe, and of water which is necessary to sustain life—the endless combinations of the gases with each other and with other elements in the formation of the various substances of which the earth is composed—the revelations by the microscope of the minute and perfect structure of plants and animals, afford an evidence of design and omnipotence which leads the mind to contemplate the great first cause.

The Pharmaceutical Society, while encouraging and facilitating a more intimate acquaintance with the physical properties of matter and the sublime truths of science, is also intended to exercise a practical influence, by leading us to make the best use of the abilities we possess, to promote harmony and good-will amongst each other, and thus to become useful members of our profession and of society in general.

The Report about to be read by the Secretary was open to discussion, and the Council would be glad to hear the opinion of the Members on the subjects to which it referred.

REPORT OF THE COUNCIL.

FINANCIAL STATEMENT,

From January 1st to December 31st, 1855.

RECEIPTS.

	£	s.	d.
Balance in Treasurer's Hands	322	13	7
19 Life Members' Fees	173	5	0
Benevolent Fund:			
Subscriptions 50 3 6			
Interest 125 7 3			
	175	10	9
Government Securities, Interest	198	13	2
395 Town Members' Subscriptions ... 414 15 0			
1854 Country Members... 1946 14 0			
317 Associates 166 8 6			
285 Apprentices..... 149 12 6			
	2677	10	0
Fees:			
10 Pharmaceutical Chemists 68 5 0			
22 Assistants 107 2 0			
54 Apprentices..... 121 16 0			
5 Fines 5 5 0			
	302	8	0
Arrears of Subscriptions	104	1	0
Lecture Fees	19	19	0
Sale of Journals	4	1	0
" Catalogues	3	14	0
Balance of Costs from Messrs. Brace and Colt	63	6	11
	£4045	2	5

EXPENDITURE.

	£	s.	d.
Life Members' Fund Investment...	188	11	3
Benevolent Fund:			
Investment 264 19 4			
Gratuities 36 0 0			
	300	19	4
Repayments	7	7	0
Tin Cases for Certificates	13	4	0
Conversazione, Pharmaceutical Meetings, &c.	39	9	7
House Expenses	40	6	4
Rent, Rates, and Taxes	350	11	4
Fixtures and Fittings	5	2	0
Postage	48	19	11
Stationery	10	16	5
Printing	63	5	3
Collector's Commission	32	17	4
Board of Examiners	33	12	0
Expenses of Society in Scotland	54	8	1
Grant to Museum, Liverpool	50	0	0
Travelling Expenses, Country Members of Council	89	6	8
Salaries	462	10	0
Wages	169	0	0
Journals	700	0	0
Delivery of Journals	121	9	6
Library	39	2	0
Museum	22	16	2
Lecture Sundries	6	4	9
Professor of Materia Medica and Botany, including duties as Curator in his department, and payment of Assistant	304	3	4
Professor of Chemistry and Pharmacy, including duties as Curator in his department, and payment of Assistant	325	0	0
Subscription to Royal Botanical Gardens	21	0	0
Prizes to Students attendg. lectures	9	8	6
Advances to Messrs. Brace & Colt, Solicitors	202	9	8
Balance in Treasurer's hands	333	2	0
	£4045	2	5

We, the undersigned Auditors, have examined the accounts of the PHARMACEUTICAL SOCIETY, and find them correct, agreeably with the foregoing Statement, and that, as shown by the books of the Society, there was standing in the names of the Trustees of the Society, at the Bank of England, on the 31st of December, 1855:

		£	s.	d.
On account of the General Fund	New 3 per Cents.	6036	7	1
Benevolent Fund	3 per Cent. Consols	4684	17	7
Life Members' Fund	3 per Cent. Consols	1203	3	7
And at that date there was due to the Life Members' Fund		47	5	0

JOHN BRADLEY,
D. J. BAILEY,
W. MANNING WATTS,
FRANCIS WARD,
Auditors.

February 10th, 1856.

The Council have the satisfaction of congratulating the members of the Society on the favourable settlement of the legal disputes which impeded its progress

during the past year, and feel assured that a steady perseverance in the true objects of the Society—namely, education and the advancement of Pharmacy—will prove that the status conferred by the title of Pharmaceutical Chemist has been productive of superior qualification in its members, and consequent security and advantage to the public. The nature and extent of the powers vested in the Society, for regulating the qualifications of Pharmaceutical Chemists, being now defined by high legal authority, may be considered fully established; and it becomes the imperative duty of those upon whom this responsibility devolves, to prove themselves worthy of the confidence reposed in them by the Legislature. The influence of each Member is required in inducing the rising generation to become connected with the Society, and affording them facilities for improvement in the prospect of passing the examination. It will also be the duty of the Council to enforce the provisions of the Pharmacy Act without favour or affection, whenever cases requiring interference are brought under their notice.

In reference to the financial statement, it should be mentioned that of the amounts under the head of law charges, in the accounts for this and the previous year, the sum of £117 14*s.* 5*d.* was for expenses incurred in 1852 and 3, relating to the general business of the Society, and including some charges for consultations and counsel's fees at the time the Pharmacy Bill was before Parliament, and also for the framing of the Bye-laws. The charges connected with the subsequent litigation, and paid in the years 1854 and 5, amount to £1087 13*s.* 8*d.* Deducting the taxed costs paid by the prosecutor, £403 5*s.*, the balance, £686 8*s.* 8*d.*, is the cost to the Society arising from the litigation.

THE ADULTERATION OF DRUGS.

The appointment of a Parliamentary Committee to investigate the adulteration of food and drugs, has brought prominently under the notice of the public many fraudulent practices, as well as various imperfections in the quality of commodities arising from accident or negligence. The attention of the Society has always been directed to these abuses; and examples of impurity, with the means of detection when practicable, have been among the regular subjects of discussion at the Pharmaceutical meetings. A considerable improvement has taken place in the quality of drugs and chemicals, in consequence of these efforts of the Society, a circumstance overlooked by most of the witnesses before the Parliamentary Committee. The sweeping and indiscriminate charges which have been brought against the entire body of Chemists and extensively circulated by the press, have caused no less surprise than annoyance to those who have been for many years successfully using all their endeavours to bring about an improvement. The statements which have been industriously circulated with a view of exciting alarm, are in most instances greatly exaggerated, and simply calculated to mislead the public. The Council believe that the course adopted by the Society for rectifying abuses by improved education, by the discussion of cases as they arise, and the publication of the best tests for impurity, will be the most effectual means of checking adulteration and the sale of inferior drugs. By raising up a class of Pharmaceutical Chemists possessing superior qualification, and aspiring to a professional reputation, a great benefit will be conferred on the public, and a practical remedy offered for existing imperfection. In the event of any legislative measure being proposed for the suppression of fraud and adulteration, the Members of the Society will have the opportunity of discussing its provisions and offering such suggestions as their experience may lead them to recommend.

THE EXAMINATIONS.

The Board of Examiners in London and Edinburgh have sat regularly during the past year. The total number of candidates who have passed during 1855 are:—

Classical ... 59 —— Minor ... 46 —— Major ... 15.

This number is decidedly below the average, so far as relates to the Major Examination; but the Council consider the numerous annual additions to the list of Registered Apprentices a favourable indication, as it is from the apprentices of the present time that future Members will be supplied. Some of the Candidates during the past year have displayed a superior amount of knowledge in the scientific branches of education as well as in practical pharmacy, and an acquaintance with prescriptions. In other instances the result of the examination has not been satisfactory; and although a considerable improvement has taken place generally, the standard of proficiency, which it is the object of the Society ultimately to introduce, has not yet been attained.

THE SCHOOL OF PHARMACY.

In consequence of the illness of the Professor of Pharmacy, at the time for preparing the annual account, the Council regret the necessity of deferring this part of the Report, but have the satisfaction of stating in general terms that the School of Pharmacy has been well attended during the past year.

THE PHARMACOPŒIA COMMITTEE.

Some progress has been made in the preliminary labour of the Committee, which consists in the arrangement of the materials of the three Pharmacopœias, with a view of assisting in the compilation of a national Pharmacopœia. Copies of the list of Materia Medica were circulated among the members of the Society with a request for suggestions and replies to inquiries respecting the frequency or otherwise of the demand for the articles enumerated in the list. The number of lists returned was comparatively small, but some practical suggestions have been received, and the list is revised and corrected, subject to the approval of the College of Physicians. The Committee have entered upon the consideration of the preparations, commencing with the acids and alkalies, which have been subjects for discussion at some of the evening meetings. The Council have offered prizes for essays on some of the preparations in the Pharmacopœia, and think it probable that other subjects of a similar nature might be selected with advantage, as a means of obtaining practical information, and encouraging researches.

PHARMACEUTICAL MEETINGS.

The regular Pharmaceutical meetings both in London and Edinburgh have been generally well attended. Similar meetings have also been held at Liverpool and Manchester, reports of which have appeared in the Provincial Transactions. The preparations of the Pharmacopœia afforded useful materials for discussion, and the subject of the adulteration of drugs has also been under consideration at these meetings.

THE LIBRARY AND MUSEUM.

The Council have again to notice the small number of applicants for books at the Library; although the librarian is at his post every evening, his services are very seldom called into requisition. The Museum has not made much progress during the past year, the space being insufficient for the materials comprised in the Society's collection. The Council look forward to the enlargement of the Museum when more commodious premises can be secured, which they consider desirable as soon as an opportunity offers.

THE ORGANIZATION OF THE SOCIETY.

The Council again advert to the duties of the local Secretaries and the importance of maintaining an efficient organization of the Society. The distribution of the Journals through the medium of the post has had the effect of relieving the local Secretaries from a portion of their duties. It is, however, desirable that their official position should continue, and that in every town in which there are two or three Members, one should be appointed annually, or at

such interval as may be agreed upon, to conduct the correspondence of the Society in the locality, and to call the other Members together when occasion requires. This arrangement has been attended with practical advantage on several occasions when appeals to Parliament were necessary in defence of the common rights and interests.

PROFESSIONAL ETHICS.

It has been the policy of the Society to abstain from interference with regard to the regulations adopted by individuals in the management of their business. Any advice or suggestion on this head has been of a very general nature, and not in a spirit of dictation. The Council think, however, that some advantage might arise from the voluntary adoption of certain principles which may be recommended for the observance of Members so far as they may individually find it practicable. The code of ethics issued by the Pharmaceutical Association in America, and published in the *Pharmaceutical Journal* (vol. xii., No. 8, page 370), is intended for the guidance of the Members, with a view of raising their professional character, and discountenancing practices prevalent more or less in most trades, and coming under the definition of quackery. One object of the Pharmaceutical Society, and one which may be expected to follow as the natural result of improved education, is the acquirement by the members of a professional character. This improvement must be gradual, and will require a considerable time for its development, which may be expedited by bringing the subject under the notice of the Members whenever a suitable opportunity occurs.

Mr. Peacock moved that the Report now read be received and adopted, and printed in the Transactions of the Society.

Mr. Clift seconded the resolution.

Mr. Kent expressed his satisfaction at hearing that peace was restored. Peace in a family, peace in a nation, and peace in a Society, was equally essential to prosperity, and a subject of congratulation.

A Member thought it desirable that the Report of the Council should be in print and in the hands of the Members at the Annual Meeting, as it was difficult to discuss it from merely hearing it read.

Mr. Jacob Bell said the financial statement was in the hands of the Members, and had been published last month in the Transactions. There was a practical difficulty in placing a complete Report in the hands of each member, as the Report was seldom finished until the morning of the Meeting. On that occasion some corrections and additions had been made at the meeting of Council which preceded that meeting.

The Member still was of the same opinion.

Mr. Waugh remarked that it was sometimes desirable to insert an allusion to passing events, and the Conversazione last evening might have been very properly mentioned as a favourable indication of the progress of the Society.

Mr. Bastick thought the Report might easily be printed in time for the Meeting. With regard to the Library, he could partly account for the very small attendance, as he observed scarcely any new books had been purchased last year.

Mr. Deane remarked that £39 2*s*. in the account related to the Library. If the Members desired any new book or books which the Council had not procured, a suggestion to that effect would always meet with attention.

Dr. J. B. Edwards asked Mr. Deane whether any progress had been made in his project for obtaining new premises, as the accumulation of specimens in the Museum, and the crowded state of the premises on the previous evening, must have convinced every one that the space was insufficient for the various departments of the Society.

Mr. Deane said he had nothing to report on the subject at present. Some premises had been in prospect, but it was difficult to find a suitable site. It was very desirable to enlarge the dimensions of the building, especially the Museum, many specimens being buried and useless for want of space. He regretted to state with

reference to his scheme, that it had not met with much encouragement hitherto, but he hoped that by that, or some other means, the object would be attained.

Mr. BOTTLE congratulated the society on the progress since last year. Some of his suggestions had been adopted—the financial report circulated (the entire report would have been better). He congratulated the Members on the transmission of the Journal by post, and also on the reduction in the amount of collector's poundage. He hoped that item would dwindle down to nothing. The Country Members paid without a collector. The law charges and all other charges should be paid during the current year, otherwise the Members had an erroneous impression. The omission of the report of the Professor of Pharmacy was rather odd, unless he had been more seriously ill than he (Mr. Bottle) believed he had. He could not congratulate the Society on the increase of Members, as the number seemed rather to decrease, but the Apprentices were on the increase. The attendance of the Members of Council, as reported, was, on the whole, satisfactory.

Mr. BELL did not concur in Mr. Bottle's inference from the decrease in the collector's poundage; he might as well rejoice at a decrease in his income-tax, which would denote a corresponding diminution of income. The law charges had been purposely deferred, pending the proceedings, as the bill, if sent in, would have been accessible to the opponents, which was not desirable under the existing circumstances. The illness of Mr. Redwood had occurred about two weeks ago, at the time the Council required his assistance in reference to the financial account of receipts and expenses in the School. He had been confined to his bed, and was not yet well enough to resume his duties.

The PRESIDENT said, with regard to the list of Members, that the number on the register was 500 more than at the same time last year. The proposed publication of the list in July was an inducement to pay the subscription in time. Those who were in arrears were not of necessity separated from the Society, many of them would probably pay up.

Some conversation ensued about the collector, the substance of which may be found in the report of the meeting last year and some previous years. It was further stated that the collector was not at all overpaid for his trouble, as he had to call on many Members two or three times, and the distances were wide.

Mr. PEACOCK thought the objections penny wise and pound foolish; and it appeared to be the general opinion that in London, Manchester, and Liverpool, a collector was necessary.

Mr. MCCULLOCH said his experience in institutions led him to this conclusion.

Mr. WOOLLEY stated, that at Manchester the collector did not receive his instructions until the end of February, and all who paid before that time saved the poundage to the Society.

Mr. PEACOCK said the Council should be more active in securing to the Members the privileges of the Pharmacy Act, which consisted chiefly in a title. Many persons not Members assumed the name and title, and if the Council allowed it the Members would cease to value the privilege.

Mr. BELL replied that the Council had taken proceedings in every case which had been brought under their notice. They had not found it necessary to go into Court, as the parties had discontinued the offence on the first notice of proceedings. It was useless as well as unfair for Members who knew of cases to blame the Council, who have not this information, because they do not take proceedings, which they are unable to take for want of the information which those who blame them are in possession of, but keep to themselves.

Mr. EDWARDS (Dartford) confirmed the statement that the Council proceed whenever any case is brought under their notice.

Mr. MCFARLANE questioned the propriety of closing the Report until the last moment. Some of the country Members of the Council might desire to make suggestions, which they could not do if the Report were finally closed at the previous meeting of Council. It was not contemplated that the country Members of Council should attend every meeting. Their presence occasionally he thought useful, and should have attended oftener himself, but on two or three occasions was prevented by indisposition. He congratulated the Society on the harmonious proceedings.

Mr. SOUTHALL (Birmingham), in retiring from the Council, after seven years of office, took the opportunity of expressing the satisfaction he had felt in attending the meetings. At first he felt some little jealousy, supposing that as a country

Member he would have but little weight. He had been agreeably surprised at the great courtesy and attention which he had received in common with other country Members. He thought the Members should have confidence in the Council. They should be careful to elect the right men, and having done so, should not tie their hands too much. They had a responsible duty to perform. The reports about adulteration of drugs required some attention, and showed the necessity for improved education, that they might not be called ignorant or incompetent.

Mr. Giles (Clifton), in retiring from the Council, confirmed the sentiments of Mr. Southall. He thought the country Members useful on the Council, but a change was desirable, so that other localities might in turn be represented. Much had been done, and much remained to be done. That which had been done had been done by the Society in its collective capacity, a system of education had been framed, examinations established and recognized, and a library and museum provided; what remained to be done devolved chiefly upon Members as individuals, by maintaining the credit of their position, and performing their duties towards those who were to succeed them. He feared many were allowed to enter the business whose education was very inadequate to the position they would hereafter be required to fill, and he would urge the Members of the Society to act conscientiously towards parents who needed advice in reference to the capabilities of their sons, as it would be a gross injustice to them and to the Society to accept as pupils those who were imperfectly educated.

Dr. J. B. Edwards concurred in this opinion. Masters might protect themselves from disappointment in the qualifications of their Apprentices, and benefit the youths themselves, by requiring every candidate for apprenticeship to obtain at once the necessary certificate of the Classical Examination, and expecting him to join the Society as soon as he has determined to enter the business. The definite prospect of the Minor Examination would then prove a constant stimulus to their minds, and the receipt of the Journals from month to month would naturally influence them to avail themselves of every opportunity of improvement. In cases where connexion with the Society was delayed indefinitely, he thought a degree of indifference was induced which was incompatible with successful progress.

A Member having alluded to the Prizes offered by the Council, the President took the opportunity of saying, in reference to the Botanical Prize, that in answer to a question which had been raised, the Council had decided that the age, twenty-one years, should apply to the time when the Prize was offered, and not to the time of adjudication.

Mr. Allchin moved a vote of thanks to the retiring Council, which was seconded by Mr. McCulloch, and carried.

The following Members were appointed Scrutineers:—Messrs. Hills, Constance, Windle, Wood, Francis, Allchin, Horncastle, Kettle, Galliers, Hopkins, Mason, and Stone.

Thanks having been voted to the Chairman, the meeting was adjourned until Friday morning, eleven o'clock.

ADJOURNED MEETING,

Friday, May 23.

MR. J. T. DAVENPORT IN THE CHAIR.

Mr. Galliers, the Chairman of the Scrutineers, presented the following Report:

We, the Scrutineers appointed at the Fifteenth Annual General Meeting of the Pharmaceutical Society of Great Britain, do hereby certify that we have duly examined the voting papers committed to us, and report the following results:—

Voting papers allowed	774
Disallowed for informality	26
	800

Bell	758	Macfarlane ...	665	Brew.....	529	Williams	421
Hanbury	738	Waugh	651	Herring ...	486	Peacock	418
Morson.....	722	Smeeton	636	Keeling.....	459	Quiller	416
Edwards, J. B.	704	Gifford	587	Palmer	444		
Bird	679	Smith	548	Thomas ...	444		

The Auditors were elected unanimously.

(Signed) George Galliers, *Chairman* — W. K. Hopkin
Edward Constance — G. B. Francis
Jno. Wallis Mason — John Horncastle
Thomas William Stone — William Windle
Thomas Hyde Hills — Alfred Allchin
Joseph Kettle — Edward Wood

Mr. Palmer and Mr. Thomas having an equal number of votes, and only one of them being required to make up the number to be elected, it became necessary for the Chairman to give a casting vote, which was done by lot, the name of Mr. Palmer having been drawn, and he was declared duly elected.

The Chairman declared the Council and Auditors for the ensuing twelve months to consist of the following Members :—

COUNCIL.

Bell, Jacob, 338, Oxford Street
Bird, William, 42, Castle Street, Oxford Street
Brew, Thomas A., 71, East Street, Brighton
Bucklee, William H., 86, New Bond Street, London
Davenport, John T., 33, Great Russell Street, London
Deane, Henry, Clapham
Edwards, J. B., 52, Berry Street, Liverpool
Edwards, George, Dartford
Gifford, Joseph, 3, Gloucester Place, Camberwell
Hanbury, Daniel Bell, Plough Court, Lombard Street
Herring, Thomas, 40, Aldersgate Street
Keeling, George R., High Street, Epsom
Lea, John W., 68, Broad Street, Worcester
Macfarlane, John F., 17, North Bridge, Edinburgh
Morson, Thomas N. R., 19, Southampton Row
Palmer, Robert, 33, Wilton Place, Belgrave Square
Smeeton, Edward, 22, Commercial Street, Leeds
Smith, Nathaniel, 373, High Street, Cheltenham
Squire, Peter, 277, Oxford Street, London
Waugh, George, 177, Regent Street
Woolley, James, 68, Market Street, Manchester

AUDITORS.

Bower, William, 96, Tottenham Court Road
Carr, John, 171, High Holborn
Haselden, Adolphus, 18, Conduit Street
Hill, Arthur B., 11, Little Britain
Pedler, George S., 199, Fleet Street

Mr. Bell moved, and Dr. J. B. Edwards seconded, a vote of thanks to the Scrutineers, which having been carried unanimously, was acknowledged by Mr. Galliers.

PHYTOLOGICAL CLUB.

17, *Bloomsbury Square*, *May* 14*th*, 1856.

ROBERT BENTLEY, F.L.S., PRESIDENT, IN THE CHAIR.

A communication was read from Mr. T. B. Groves, of Weymouth, on the occurrence of stomata on the scales of bulbs which he brought forward as an additional proof of their leafy character.

Mr. Braithwaite made a communication on some nutgalls that had been forwarded to him from Mr. George Glanfield, of Torquay. Mr. Glanfield stated that he collected them in a young plantation near Torquay, and that he believed not a single tree came under his notice that was not more or less affected with this scourge. He also stated that it was generally extending from Devonshire into the adjoining counties.

Mr. Braithwaite stated, that in all those that were imperforated he found the

larva or grub on breaking them. He had subjected them to analysis with a view to determine the amount of tannin, which he found to be very small, not exceeding one per cent.

The means of organizing a botanical excursion were then considered.

It is proposed that the excursion shall take place on Saturday, June 21st.

Those gentlemen who intend joining, are requested to assemble at the North Kent Line Station, London Bridge, at 10 30 a.m., or at Dartford, 11 30 a.m.

PROVINCIAL TRANSACTIONS.

LIVERPOOL CHEMISTS' ASSOCIATION.

Royal Institution, 24th April, 1856.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

Mr. W. Edwardson was elected a Member of the Society.

The SECRETARY announced the donation to the Library of Lavoisier's *Chemistry*, by Mr. Edwardson. He also announced that Dr. Nevins had offered to admit any of the Members of the Society to his lectures on Materia Medica at the Royal Infirmary School of Medicine for half the usual fee.

The PRESIDENT then called the attention of the meeting to a very handsome offer made by Mr. H. S. Evans, who proposed to present the Society of Arts Prize Achromatic Microscope, for the best Essay on the Application of the Microscope to Pharmacy, to be competed for by the Assistants and Apprentices belonging to the Association. The precise terms upon which the Prize was offered were not finally arranged, but would be announced to the Members by circular.

The "President's Prize," consisting of Thomson's *London Dispensatory*, and which was awarded at the last meeting to Mr. W. Kitchen, the successful competitor at the examination of the pupils in the laboratory class, was presented by the President.

A Lecture, of which the following is an abstract, was then delivered on

CHEMISTRY IN ITS RELATION TO THE OTHER SCIENCES.

BY GEORGE HAMILTON, ESQ., F.C.S., F.R.A.S.

After an eloquent introduction, in which he referred to the recent discoveries in science, the progress of the arts, the spread of knowledge among all classes of society, and the growing love of intellectual culture and refinement observable everywhere around us, he glanced at the principles upon which the sciences of mathematics and astronomy are based, and said if we arranged the sciences in a series commencing with the most simple and proceeding according to the degree of complexity, astronomy would occupy one end of the scale and geology the other. Between these extremes each science takes its place according to its dependence on those which precede, and its independence of those which follow. We are guided in the classification by two well-marked divisions of matter, organized and unorganized. Botany and zoology taken in their widest signification comprehend all the phenomena arising from organization and vitality, from the simplest vegetable cell up to man. Unorganized matter is the subject of physics and chemistry. Physics treat of matter in masses, the forces which act on such masses, and the resulting state of equilibrium or motion, all being susceptible of quantitative determination. Terrestial physics take cognizance of the three states or forms of matter—solid, liquid, and gaseous. When our inquiries relate to solids kept at rest by the action of two or more forces they come under the head of statics; when motion results, a new element—time, is introduced—they belong then to dynamics. Under these heads are discussed the laws of motion, the centre of gravity, the mechanical powers, the laws of falling bodies, &c.

Hydrostatics and hydrodynamics treat respectively of liquids at rest and liquids in motion. Under the former are discussed the pressure of liquids, specific gravities, equilibrium of floating bodies, and the ascent of liquids in capillary tubes; under the latter the motions of fluids through pipes and orifices, and the various machines which are propelled by the agency of water. The science of pneumatics is concerned with elastic fluids as gases or air ; it treats of the weight or pressure of the atmosphere, of pumps, and other pneumatic machines.

The connexion of the sciences is shown by the fact that solids, liquids, and gases are not distinguished from each other by well-known boundaries. Solids pass into liquids by insensible degrees, and liquids into gases. The phenomena exhibited by bodies in the intermediate states are often distinct from those of the extreme terms and yet have relations to both. A solid moves as a mass down an inclined plane with an accelerating speed, water flows through a channel adapting itself to every inequality of surface, and winds with facility through the most tortuous course; but a glacier slowly descends to the valley neither as a solid nor as a liquid, yet like a solid it exhibits cohesion, and like a liquid, molecular movement.

Between physics on the one side and physiology on the other, chemistry takes an intermediate place, marking the connexion between organized and unorganized matter. By its light are revealed to us some of those beautiful harmonies on which the mind loves to dwell, as the mutual dependence on each other of the three kingdoms of nature. By its aid the passage of the mineral constituents of the globe may be traced to vegetable organisms, and up to animals of the highest class, again to return to the condition of inorganic matter, again to pass through the same cycle of change. Chemistry, as well as physics, is concerned with matter, force, motion; but, unlike physics, it has not the means of making any one of these the subject of direct observation or measurement. The absolute size and weight of an atom of matter, the law of the forces concerned in causing chemical combination to ensue, and the consequent motion which takes place in mingled solutions, will probably never be known. Chemistry, therefore, would seem at the outset to be wanting in all the conditions necessary for rising to the rank of a science, yet, by accumulating vast stores of facts, by the use of ingenious hypotheses, by the construction of theories which seem almost to supply the place of fundamental data, by tracing analogies among bodies of similar composition and form, and by submitting all speculations to the ultimate test of rigid experiment, chemists have advanced their science in a manner to which history can offer no parallel. Although chemistry is still in its first stage of development—its infancy—it has conferred immense benefits on mankind. It has multiplied the products of the soil by giving to agriculture a basis of scientific truth. It has thrown new light on physiology, and given many useful rules for the preservation of health and the cure of disease. It explains the processes and products of respiration and decay, and the part which they play on a grand scale in the economy of nature. It explains the composition and properties of substances, whether animal, vegetable, or mineral, and teaches the operations by which useful products can be formed. Metals, alloys, pigments, essences, oils, varnishes, medicines, are chemical products; bleaching, dyeing, tanning, brewing, distilling, baking, cooking, are chemical operations. Every science, as well as every art, receives some light, direct or indirect, from chemistry. Geology is especially dependent on it for assistance. It explains the composition of the minerals which form the constituents of rocks, their metamorphoses by heat, their disintegration by exposure to air; the processes of crystallization from fusion or solution, the formation of siliceous and calcareous incrustations and deposits, pseudomorphic action, and the petrefaction of organic remains. In studying the facts of the science, we are led on from step to step by a pleasing fascination, produced by the very beauty of the experimental results. When we venture into the dim paths of its philosophy, guided by the tremulous and uncertain light of hypotheses, still we are led on by a desire to know what is beyond. Here we have need of all the caution and logical method acquired by the study of the more exact science of mathematics, that we may permit imagination to exercise its legitimate function, and prevent its encroaching on the province of reason. If chemistry is only in its infancy, what limits shall be assigned to its maturer powers, what bounds to its future speculations?

It is better to assign no limit to either, but labour on with all earnestness of mind to do and to learn as much as we can. One by one have the limits been passed which have hitherto been assigned. It was said that chemistry could predict nothing, since it has no axioms and no general laws; but we see, in the recent doctrine of homologous series, the possibility of determining beforehand the composition and properties of compounds not yet discovered. It was thought that the chemist could make no organic compound from inorganic elements: he has not only accomplished this, but he has artificially prepared compounds which were supposed to be formed only in living organisms. And it is probable that the last link wanting to complete the connexion of pure chemistry with pure physiology, has already been

supplied in the artificial formation of cells of albumen around nuclei of oil. If the exosmose and endosmose really take place as described,* there seems to be but little wanting to convert this chemico-physical action into a *quasi* vital process.

Between chemistry and physiology there is an intermediate or border province, a physiological chemistry or chemico-physiology rising rapidly to the rank of a science. This, in its turn, will lead to a rational science of medicine. Thus the whole dominion of philosophy is amplified by the co-ordinate expansion of the sciences, each extends its boundaries outwards to meet and coalesce with every other. The forces which act on matter have relations to each other so intimate, that we may pass by easy gradations from the most obvious and simple to the most mysterious and subtle. Gravitation prevails between masses at a distance from each other. Cohesion prevails between particles apparently in contact. It would be rash to say that these forces are identical; it would be equally so to say that they are not. In a mass of sulphur or iron the particles are held together by cohesion, but when sulphur and iron combine they are held together by affinity. The distinction here between the case of one substance and the case of two different substances, seems complete, as all distinctions seem when our knowledge is incomplete. What is meant by different substances? It is not enough to say bodies having different properties, for some of the allotropic states of the same substance exhibit differences more remarkable than those which distinguish some substances from each other. Thus the difference between common and red phosphorus; between common and plastic sulphur; between plumbago, charcoal, and diamond; between oxygen and ozone are more remarkable than the differences between potassium and sodium, barium and strontium, bromine and iodine, palladium and platinum. We choose to give the name affinity to that force which causes the union of substances having different properties and cohesion to the force which holds the particles together in a mass. The forces may be identical for anything we know to the contrary. There is therefore a remarkable relation between gravitation, cohesion, and chemical affinity. Now, mark how easy the transition from these to the mysterious and subtle agents whose *nature* has so severely taxed and tested the reasoning powers of philosophers. When a plate of zinc and another of platina are put into a vessel containing water acidulated with sulphuric acid, the oxygen of part of the water and the sulphuric acid unite with the zinc. This is a case of affinity. If copper wires with platina points be attached to these plates, and the platina points dipped into acidulated water in another vessel, the water will be decomposed. This is electrolysis or galvanic action. The quantity of water decomposed in each vessel is the same, the only difference in the conditions being that the oxygen, in the one case, is fixed to the zinc—in the other, it is set free. This may be compared to the act of poising a bar on its middle point and moving one end, the other end moves also, the motions are simultaneous and equal, though in opposite directions. Thus affinity is connected with galvanic electricity. When a spiral coil of copper wire is supported on its centre so as to admit of a motion horizontally, and is connected by means of mercury with the wires of a galvanic battery, the spiral coil of wire acquires polarity and all the other properties of a magnet; and if a bar of steel be placed within the coil it acquires permanent magnetism. Thus galvanic electricity is connected with magnetism. When the plates of a battery are increased in number and alternately arranged, the decomposing power is exalted. When 1000 pairs are used the gold leaves of the electrometer may be deflected, the Leyden jar charged, and all the phenomena produced of frictional electricity. Those who assert that chemical affinity, galvanism, magnetism, and electricity are merely different forms of the same force, may add to the list cohesion and gravitation, and produce many arguments to support the assertion. It is safer, however, and more philosophical to content ourselves with the observation of relations and resemblances among the various classes of phenomena which we may know, than to assert anything about the *nature* of forces which we cannot know. We know only phenomena. Of force in the abstract we have no clearer conception than we have of eternity or boundless space.

When the conducting wires of a powerful galvanic battery in action are connected by a wire of platinum, the platinum becomes red hot, and if terminals of charcoal be employed, brought into contact and slightly separated, a brilliant light

* See *Micrographical Dictionary*, article Cell.

appears. What are this light and this heat? They are phenomena correlated, in this case, to the affinity in the cells of the battery, and, to a certain extent, exponents of its energy; and in any other case where heat and light are produced they are due, if not to affinity, then to some other equivalent force. We have no objection to imaginary undulations of hypothetical fluids, as a device to assist in classifying and remembering facts ; but the strongest possible objection to all imagination and hypotheses in grave answers to the questions—What? and How? and Why?

There is something strikingly impressive in the truth that neither matter nor force can be either created or destroyed. If, says the mathematician, two equal and opposite forces act on a body, the forces neutralize each other, and the body remains at rest. Not so, says the philosopher, heat is given out, which enters and expands surrounding objects, thus the forces which disappear in one form at one place, reappear in a different form at another. Even animal force is not initiated in the animal organism, it is a product of digestion—that is chemical action, which is itself referrible to solar heat and other stimuli of *vegetable* growth. Thus science traces a force to one antecedent, and to another, and another, back to the very boundary of that misty region of uncertainty which imagination claims as her own. Here then we find ourselves placed in a vast system of change, on whose origin and end we cannot even speculate. The more profoundly we study its laws, the more deeply are we impressed with the wisdom and beneficence of its arrangements and an elevating, purifying, ennobling sentiment arises in the soul, suggestive of other changes which yet await us, whose glories will as far transcend our earthly experience as eternity transcends time.

The thanks of the meeting were presented to Mr. Hamilton for his highly philosophic and interesting lecture.

Thursday, 8th May, 1856.

THE PRESIDENT, MR. ABRAHAM, IN THE CHAIR.

Mr. Terrick J. Williams was elected a Member, and Messrs. Pearson and Tomlinson Associates of the Society.

Mr. Mercer made a communication to the meeting on the subject of transferring collodion films from the glass on which the pictures have been produced, to paper, explaining and illustrating with specimens the processes of McInnes, Rollason, and Archer. He also exhibited a novel photograph in the shape of a view of the bottom of Weymouth Bay, taken eighteen feet under water by Mr. Thompson, and lent to Mr. Mercer by Mr. Penny, of Poole.

A lecture, of which the following is an abstract, was then delivered by T. C. Archer, Esq., on

THE USEFUL PRODUCTS OF THE NATURAL ORDER GRAMINACEÆ.

This order is probably the most remarkable of all, for the large number of its useful species, and their very great importance to the human family generally, as well as to a large portion of the animal kingdom ; but he did not intend referring specially to the grasses which yield the food of the animals most useful to man, nor to the cereals which are in common use in our own houses, but to bring before the Society some facts in the history of those graminaceous plants which are less generally known.

A very nutritious and highly palatable grain is yielded by the Glyceria Fluitans, which is collected for food in Russia. This plant is a native of Britain, and is found abundantly in shallow running waters ; although a most abundant bearer, the seeds are never collected in this country; but in Russia their collection is an important branch of industry. To collect them the peasant takes an old felt hat, and, wading in the water, skims the hat among the patches of glyceria when the grain is ripe, the seeds fall into the hat, and in this manner are saved. The Sorghum vulgare, or the great Indian Millet, is identical with the darra of the Turks and Arabs, the negro corn of Africa, and the broom corn of North America. It is largely cultivated in the United States and West Indies as food for the black population, and the branching wiry stems of the panicle are used for whisks and carpet brooms. Sorghum saccharatum has lately been proposed as a source for sugar, but with no great prospect of success.

The genus Andropogon is remarkable for the number of highly odorous plants

which it contains, and several of them also yield sweet-scented essential oils. Thus A. Ivarancusa yields the Roosa oil of India, used as a rubefacient in rheumatism by the native practitioners, and in Europe as a perfume under the name of Oil of Rose-scented Geranium. A. Schenanthus yields in Ceylon the beautiful Lemon grass oil, or Oil of Verbena, as it is sometimes called, from its resemblance to the Aloysia Citri-odora, or sweet-scented Verbena. We are apt in this country to think that wheat is the most extensively used of all the cerealia; this is not the case, the number of human beings who feed upon rice is greater, and its astringent qualities render it far superior as a food in tropical climates. He exhibited a curious preparation of this grain, much used in India as an accessory to the dessert. It is prepared in a manner similar to the pop-corn of the Americans, that is, by soaking the grain and then throwing it on a plate of iron placed over a fire. The grain submitted to this process explodes by the expansion of the steam within, and turns inside out. The aquatic rice of Canada, *Zizania Aquatica*, is said to be an excellent eatable grain, but has never been much cultivated, probably from its aquatic habit. Many other useful products of the Graminaceæ were alluded to, and amongst them those of the genus Bambusa, whose lofty hollow stems, the common bamboo canes, are used for an infinite variety of purposes by the ingenious Chinese and East Indians. The facility with which these hard-wooded culms split, gives great scope to their useful applications, and the large size of their internodes admits of many useful articles being formed from them. They are used in building and furniture-making in the lightly-built Chinese dwellings, and they also form admirable fences, and cut up for a vast number of different uses; the young shoots are often pickled or preserved in sugar as a succade. A curious product called Tabasheer, supposed to have peculiar prophylactic virtues, is secreted in the nodes; it consists only of silex, which mineral is secreted by most of the Graminaceæ, and is generally deposited on the stems in the form of a glossy varnish, as in straws of wheat and other cereals.

The thanks of the meeting were passed to Mr. Archer for his instructive lecture, which was illustrated by specimens of most of the articles alluded to.

Dr. Edwards and Mr. Archer exhibited two very excellent and economical microscopes, one, the Society of Arts Prize Microscope by Field, and the other, manufactured by Mr. Parkes of Birmingham. Mr. Archer also placed before the meeting a simple and ingeniously constructed dissecting microscope made by Mr. Parkes.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

The Annual Meeting was held in the Society's Lecture Room, 2, Victoria Street, on Friday, May 1st, at 3 p.m.

MR. WOOLLEY IN THE CHAIR.

The Chairman called on the Secretary to read the Report of the Committee, of which the following is a copy:—

"In presenting a report of the proceedings of the Manchester Pharmaceutical Association during the past year, the Committee, whilst expressing their satisfaction at the success which attended their appeal for support to the Chemists of Manchester and Salford, do not attempt to conceal their regret that a larger number have not joined the institution, and that many who from their education and other circumstances might have been expected to be zealous and active Members, have hitherto kept aloof; yet the numbers, position, and influence of those who are already Members, give every reason to hope that as the Society becomes more firmly established, its objects better known and more widely appreciated, and its beneficial effects seen in the improved education of the younger Members of the Pharmaceutical body, it will obtain the support of many who have not yet joined its ranks, and eventually arrive at a position worthy of the city in which it is established.

"In carrying out their plans for the educational objects of the Society, your Committee have endeavoured to secure instruction of a practical and useful kind, more especially adapted to the daily requirements of the Pharmaceutist, care being taken at the same time not entirely to neglect the higher branches of chemical science.

"During the past year courses of lectures have been delivered on Materia

Medica by Mr. Somers, on Botany by Mr. Grindon, and on Chemistry by Mr. Stone, which were attended by numerous classes of students, whose earnest attention and general conduct have been highly spoken of by the lecturers.

"The Council of the Pharmaceutical Society having recently announced their intention of making their examinations much more severe in regard to a knowledge of Botany on the part of the candidates, your Committee, feeling the importance of the subject, and knowing the very slight opportunities the young men possess for acquiring any botanical knowledge, have made arrangements with Mr. Grindon to deliver a course of lectures on botany to the students of the Society during the ensuing summer months.

"During the winter months evening meetings were held in the Lecture Room of the Society, at which lectures have been delivered or papers read by Messrs. Grindon, Roberton, Ransome, and Wilkinson, and many subjects of interest brought forward and discussed. Reports of these meetings have been published in the *Pharmaceutical Journal*. The Committee very much regret that these meetings have not been more numerously attended, and feel assured, that if the Members would individually endeavour to attend as often as possible, even if some little sacrifice of time and convenience were involved, they would be amply compensated by the increased cordiality and good-will created amongst the Members, independently of the benefits to Pharmaceutists generally that arise from the discussion of matters connected with the business on which various opinions are held. The Committee hope that their successors will give their attention to this subject, and, if possible, devise some means by which a better attendance may be secured, whether by an alteration in the time of meeting, or any other arrangement that may be thought advisable."

The Treasurer's account is as follows:—

Dr.

	£	*s.*	*d.*
Members' Subscriptions	22	11	6
Students' Fees	17	5	0
	£39	16	6

Cr.

	£	*s.*	*d.*
Rent and Taxes	7	13	4
Printing	2	19	0
Postage	2	10	3
Fixtures	2	1	0
Stationery	0	13	9
Advertising	0	12	6
Sundries	0	13	3
Cash in hands of Secretary	1	0	0
Balance	21	13	5
	£39	16	6

Examined and found correct, H. PEATSON, J. WYLDE, *Auditors.*

Mr. STANDRING moved that the report now read be adopted, and the Treasurer's account passed and entered on the minutes. He regretted the institution was not better supported, and felt surprised that the young men were not more generally anxious to avail themselves of the advantages it affords.

Mr. BROWN seconded the motion, and said it was much to be regretted that the trade should be so supine in such a cause, and suggested that each individual Member should exert himself to induce others to join the Society, and he hoped by that means an increased number of Members would be obtained.

Mr. HAYNES complained that the Members of the late Chemists' Conversational Society did not more generally attend the lectures, and said that he and many of his friends were much disappointed that so few of them attended, that they had quite expected a considerable number of them would do so, and much dissatisfaction had been felt in consequence, as it was thought, that if the principals were to attend more frequently, it would be an incentive to the young men to be more regular.

Mr. ROBERTON though there must have been some misconception on the subject, and that he and his friends never understood that they were expected to attend the courses of lectures, as these were intended especially for the young men, and that in many instances where only one Assistant or Apprentice was kept, if the principal came to lecture, the junior must stay at home, and he thought it much better that the latter should attend.

Mr. PEATSON thought that if the Members would attend as often as they could, it would stimulate the young men.

Mr. Woolley said, that as his name had been mentioned in this matter, he took the opportunity of saying that he had an engagement every Wednesday afternoon, which he could not put off, and could not possibly attend the lectures.

The motion was then put and carried unanimously.

A code of Bye-laws for the government of the Society, which had been drawn up by a Sub-Committee appointed for that purpose, were read by the Secretary, and on the motion of Mr. Holyoake, seconded by Mr. Peatson, were adopted as the rules of the Society.

A list of candidates, from which to select the Committee for the ensuing year, having been sent to each Member, the voting papers were handed in by the Secretary, and Mr. J. Standring and Mr. Peatson were appointed scrutineers; who, having found the following gentlemen to have obtained the largest number of votes, they were declared duly elrcted:—

Mr. Bingley.	Mr. Lynch.	Mr. Roberton.	Mr. Tomlinson.
— W. S. Brown.	— Pyne.	— Standring.	— Wilkinson.
— Hamer.	— Ransome.	— Jas. Taylor.	— Woolley.

Mr. Robertson proposed a vote of thanks to Mr. Woolley for the able manner in which he had filled the office of President during the past year, which, being seconded by Mr. Peatson, was carried unanimously.

Mr. Woolley briefly acknowledged the vote.

Mr. Edlin then proposed, and Mr. Wylde seconded a vote of thanks to Mr. Wilkinson for his services as Honorary Secretary, after which the meeting separated.

ORIGINAL AND EXTRACTED ARTICLES.

LATEST FROM THE CRIMEA.

BY MR. JOSEPH INCE.

About two years ago a new career was offered to the Chemist's Assistant—physic, and a certain dream of glory called him to the East. The monotony of in-door life was exchanged for active service; the shop merged into the hospital, in which wounded soldiers were the customers. No wonder the authorities were besieged with applications from dispensers anxious for an appointment. There was the excitement of foreign travel; the honest and most laudable ambition of an excelsior spirit; the welcome stimulus of a liberal salary; and the recollection of the ancient adage, "Opportunities neglected never return;" whilst various other causes (not excepting the martial uniform) concurred in heightening the excitement. Seldom indeed has a better opening been presented, and not one dispenser left these shores without a fair prospect of distinction.

The young votaries of science went accompanied by the good wishes, the sympathies, and the genuine congratulations of those at home—they went the representatives of English Pharmacy—they went the living witnesses of the superiority of skill over incompetence.

With sorrow it has to be pointed out how little they realized the dignity of their position, and how in the noblest pathway to success, they saw only an ordinary situation. The race is run, but we miss the crown—the struggle is ended, where is the result?

That, however, is a question which rests mainly with themselves, but the close of another volume of the Journal forcibly suggests the inquiry, Why has no single volunteer ventured to describe, for the benefit of others, the scenes of Kululi, Scutari, and Smyrna. Next to genius is the habit of observation. A plain record of the to and fro of passing events—the history of the daily life, and medical arrangements of the hospital was all that was required. We who were working hard from early dawn to late at night, would gladly have had the weariness of our task invaded by authentic sketches of the Pharmacy of the Russian war. We should have liked to know what the Dispensers had to do,

and what they did—the drugs in most demand, the remedies prescribed, the distribution of supplies, and the effect of climate, as well as the details drawn from personal experience. Such intelligence would have delighted thousands, though expressed in phraseology wanting the brilliancy of Russell, or the elegant and sparkling gracefulness of the authoress of "Eastern Hospitals and English Nurses."

But no, our information was derived from other and extraneous sources; the dispensers made up physic, and let the world roll on as best it pleased. They have proved once more that a man must take his own light with him who would wish to shine abroad, and added a further confirmation of the old Latin sentiment, "*Cœlum non animum mutant, qui trans mare currunt.*"

Letters (it is true) which were distributed in private circles arrived from time to time, in which rambling statements contended with defective spelling, and the great object of the Crimean expedition was not more forgotten than the rules of English grammar. From these literary efforts we learn that the Turkish women wear veils and the men smoke pipes; and that the ceremonies of the Greek and Romish churches differ from those of Dr. Cumming.

A complaint has often been made that our English journals are indebted more to foreign extracts than original correspondence. To this has been returned a very sensible objection on the part of many respectable and influential persons who have been long engaged in business, that the publication of the results of their own industry would be contrary to their trade interests; but surely the most plausible effort of special pleading could not wrest such an argument into an excuse in the present instance. Let us hope the day will come when a higher standard of thought and action will prevail; let us await with confidence the advent of that time, when those who have life before them, will not drift vacantly along the stream, absorbed in a salary and the amusements of the passing hour, but will rouse themselves into that course of determined action which converts the otherwise prosaic common-place of duty into a lasting and well-earned reputation.

Stay!—— who are these who advance with noiseless step, and like ministering angels hover round the bedside of the wounded soldier? Who? but the English nurses and the Sœurs de Charité?—two languages, one heart. What is their mission in the gloomy hospital—why have they left home and friends and all, to brave the horrors and the grim circumstance of war? Because louder than the clash of arms there rose the cry for help, and with the heroism of an heroic age, they flew to aid—their mission was to save. These are they at whose approach the rude word was hushed, the spirit ceased to droop, and the lip forgot to murmur. Romance, with all its fictitious contrasts, was outdone. Within those dreary corridors and suffering wards was crowded the full accumulated agony of woe; the pestilent breath of fever, and the loathsome, fetid sore of frost-bite; dysentery with its spectral atrophy, and the dread procession of untold, mortal injuries red from the last battle-field. In that dark hour of a nation's misery, love triumphed over weakness, loyalty conquered fear, faith overcame death itself. That gentle nurse, with winning smile and willing services, who watched by the soldier's mattress, cheered his loneliness, relieved his wants, and wrote his letters; and who so often, by her assiduous care, sent him rejoicing to his friends again, has given a fashion to benevolence, and made England proud. Yes! when the memory of the war lives only in the calm page of history, never shall it be forgotten how devoted women lifted an ignoble calling into a great vocation, and how—the high priests of a golden charity—they stood between the living and the dead, and the plague was stayed.

They have left a name, as far above the littleness of praise as it is beyond the dream of ambition. Words perish, actions are eternal.

31, *Southampton Street, Covent Garden.*

PURIFICATION OF WATER SUPPLIED TO TOWNS, ETC.

At a recent meeting of the Society of Arts, the method proposed by Dr. Clark for purifying water for the supply of towns was described by him, and its applicability for this purpose discussed.

The substances with which water is contaminated may be in two states—suspended and dissolved; both may contain mineral and organic substance.

Spring water contains from $\frac{1}{20000}$ to $\frac{1}{1000}$, or even $\frac{2}{1000}$, dissolved substance, but no suspended substance. This is the case with many kinds of water in and round London; but, when collected at the surface in reservoirs, and exposed to light and air, vegetation commences, and is succeeded by the development of animalcules. After a time, both the plant and animal organisms pass into a state of putrefaction, and become a source of serious contamination.

The water of rivers generally contains less dissolved substance than that of the springs in the same district, and it also contains suspended substances of various kinds that are washed into the rivers from the banks by small streams, rivers, &c.

The separation of suspended substance is effected either by subsidence or by filtration.

The nature of the dissolved substance depends upon the kinds of strata traversed by the water; it generally consists, for the most part, of calcareous salts —sometimes with magnesian salts—alkaline salts, ammoniacal salts, rarely, and in small amounts.

The calcareous and magnesian salts communicate to water the character of *hardness*. This character varies considerably in amount in different kinds of water, and is expressed in degrees, *each degree of hardness being as much hardness as a grain of chalk, or the lime, or the calcium, in a grain of chalk, would produce in a gallon of water, by whatever means it may be dissolved.*

The hardness of most of the water around London is owing to the presence of dissolved carbonate of lime. The amount is so large, that the average supply of water to a single family would yield in eight months 100 pounds of chalk, and in 100 gallons of water there is enough to destroy 35 ounces of soap.

Carbonate of lime itself is very sparingly soluble in water; probably 5000 gallons would be requisite to dissolve one pound avoirdupois. But when combined with an additional amount of carbonic acid, it forms bicarbonate of lime, which is so much more soluble in water, that one pound of carbonate with seven ounces additional of carbonic acid would dissolve in 400 gallons of water; and this is about the amount present in well-water from the chalk strata.

The carbonic acid may be separated from carbonate of lime by heating, as in the ordinary operation of lime-burning, and the lime thus obtained is still more soluble in water than the bicarbonate of lime; so that a pound of carbonate of lime, consisting of—

Lime.....	9 ounces,
Carbonic Acid.....	7 ounces,

yields a quantity of lime that may be dissolved in 40 gallons of water.

Thus it appears that carbonate of lime, itself scarcely at all soluble in water, may be rendered soluble in two different ways—either by being deprived of its carbonic acid, or by combining with an additional quantity of carbonic acid.

It is by the latter of these two changes that water, in traversing chalk strata, becomes so highly impregnated with carbonate of lime; for carbonic acid is always abstracted from the atmosphere by water during its condensation as rain, &c., and a further amount is frequently dissolved by the water in percolating the vegetable soil.

To separate this dissolved carbonate of lime, so far as may be practicable, is the object of Dr. Clark's method of purification. It is based upon the fact that when a solution of bicarbonate of lime, such as ordinary water, is mixed with a solution of lime, half the carbonic acid is abstracted from the bicarbonate, and

both lime and bicarbonate of lime are converted into the very sparingly soluble carbonate.

When this operation is so managed that the lime added is just sufficient to form carbonate with the surplus carbonic acid in the bicarbonate, almost the whole of the dissolved carbonate will be removed from the water, and only so much will remain dissolved as corresponds with the solubility of carbonate of lime.

Bicarbonate of lime in 400 gallons	Carbonate of lime	16 oz.	
	Carbonic acid ...	7 oz.	
Lime in 40 gallons of water	.....	9 oz.	= 16 oz. carbonate of lime = 2 lbs.

This residual carbonate of lime is always small in amount. Supposing in the above instance the 440 gallons contained 17½ oz. dissolved carbonate of lime, $\frac{10}{11}$ or 16 oz. would be separated, and only 1½ oz. be left in solution. The water, before being softened, would destroy 35 oz. of soap for every 100 gallons; after being softened, the same quantity would destroy only 5 oz.

Most water contains, besides carbonate of lime, calcareous and magnesian sulphates, chlorides, &c. These substances communicate hardness to water, as well as carbonate of lime; but there is this difference—that the hardness owing to the presence of these substances is not removed by limeing. This, however, is not of any practical importance, so far as regards the purification of the water supply of London by this method; for the hardness of the water round London is chiefly owing to carbonate of lime.

Without perhaps being prejudicial to health, the disadvantages arising from the presence of carbonate of lime in water are numerous and considerable.

1. It is the principal cause of the incrustation of steam-engine boilers.
2. It causes a great, and at the same time useless increase in the consumption of soap, and is deposited in dirty linen in such a manner as to fix the dirt, and prevent its being rendered white.
3. For many culinary purposes it is less suitable than soft water.

Dr. Clark's method is remarkable, inasmuch as it differs from most chemical operations in not introducing any other substance into the water in place of the carbonate of lime separated; and, moreover, the separation is effected without the use of any substance foreign to the water in its natural state.

There is another effect produced by this method of purifying water, which does not appear to have been at first anticipated by Dr. Clark. It is the removal of organic substance.

In general the wholesomeness of water is much more affected by the presence of organic substance than by mineral substance; and it seems to be a fact well established by observation, that some of the poisons producing epidemic disease find a congenial habitat in water contaminated with organic substance. Moreover, when organic substance in water undergoes putrefaction, the sulphates always present in water are decomposed, and sulphuretted hydrogen generated. The deleterious character of the water of the Niger was ascribed by the late Professor Daniell to this circumstance.

The amount of organic substance in water may be very minute, but it must not on that account be regarded as insignificant. The amount of organic substance in the most defective kinds of water supplied in London, is very small in proportion to the mineral substance; but it is generally considered by recognized authorities, that, under certain conditions, this organic substance may acquire such a state as to produce disease in those drinking it habitually. In this respect the cause of disease existing in water is analogous to that known as sausage-poison, and that producing the frequent fatal effects of a cut with a dissecting knife, neither of which appear to be chemically tangible.

Investigations relating to the last epidemic of cholera have shown that in one district in London, containing a population of 500,000, which were chiefly supplied with water by two different companies, there were over 4000

deaths from cholera during the epidemic. The only recognizable difference in the conditions and modes of life of the inhabitants, was, that one portion were supplied with water of good quality, drawn from a point high up the Thames; while the other portion were supplied with water drawn from a lower point of the river, where it was profusely contaminated with town-drainage. It proved upon inquiry that the mortality among the former portion was 37 in 10,000, while among the other portion it was 130 in 10,000, or three-and-a-half times as great as in those houses supplied with the better water. Further inquiry showed that in the epidemic of 1848-49 the mortality was uniform throughout the district. There was no such difference between the houses supplied with water by the two companies, the mortality being in one case 118 and in the other 125; but at that period both companies drew their water from nearly the same part of the Thames, low down, where it was contaminated with town-drainage.

The method of purification proposed by Dr. Clark not only effects the separation of carbonate of lime, which as regards the wholesomeness of water is of secondary importance, but it also separates organic substance. At the print works, in Manchester, it is applied specially for this purpose, and in an experiment made upon 3,000,000 gallons at the Chelsea Water Works it is stated by Dr. Miller that the amount of organic substance was reduced to one-third.

Some doubt was expressed by speakers who took part in the discussion, as to whether the organic substance removed by limeing was that suspended or that in solution. Both are in fact removed, but it does not appear that there are any grounds for regarding the one more prejudicial to health than the other.

The removal from water of the carbonate of lime dissolved by carbonic acid, has also, indirectly, an influence upon the contamination with organic substance, by serving as a preventive of vegetation, and of the consequent development of animal organism.

When chalk spring water is pumped up from a well and exposed to light and air, in a clean glass vessel, capable of holding a few gallons, with a glass covering, and so exposed that the changes can be observed as they take place from day to day, it will be seen that all around the sides and bottom a green vegetation will appear in summer time within a few days. In process of time this vegetation tends to a brown, and if a close observation be made, a slight incrustation may be discovered, partly to float on the surface of the water, and partly to adhere to the sides and bottom of the vessel. This incrustation consists of carbonate of lime, slowly precipitated from the water by the separation of the duplicate dose of carbonic acid that kept the carbonate of lime dissolved. It is this carbonic acid that serves as the food of plants, furnishing carbon to them, and the carbonate of lime that was kept in solution by it forms the mineral part of the incrustation. If the glass vessel, after having been exposed as described for several weeks, be emptied, a dirty brownish incrustation, including vegetable substance, may be very well seen, all down the sides, and on the bottom. This brownish incrustation has a strong, offensive, marshy smell. If side by side with the spring water there be exposed, in a similar glass vessel, the same water, previously softened, the softened water will continue for weeks and months unaltered, while that unsoftened water is becoming more and more contaminated by vegetation.

So long back as 1851, the commissioners appointed to report on the quality of the water supplied to London, remarked, that "it appeared to be only a question of time, when the sense of the violation of the river purity (by town drainage) would decide the public mind to the entire abandonment of the Thames as a source of supply, unless artificial means of purification were devised and applied." They also stated, "that a careful series of experiments left no doubt in their minds that the means of conducting this process are certain in their results, and sufficiently simple to be left to the execution of a workman of ordinary intelligence, that the process falls easily into the routine operations of

water-works . . . is not attended with any peculiar difficulty on the large scale, and that the softening of Thames water in its ordinary condition by this process is perfectly practicable, at a cost which would, on the average, increase the price charged to the consumer only four per cent."*

Nevertheless, there is only one instance in which this process has been applied to the purification of water supplied for general purposes. At the Plumstead Water-Works, near Woolwich, it has been in successful operation for the last year and a half. The water supplied by this Company is derived from the chalk by boring, and has about twenty degrees hardness, which is reduced to eight degrees by limeing. The works are capable of supplying 600,000 gallons daily, and at the present time about 3,000 houses are supplied.

Eight months after the Plumstead Water Company had been carrying on the softening process with success, and much to the satisfaction of the consumers, it occurred to the Company to try how far the consumers would continue to be satisfied with the water, if the softening process were omitted.

The consequence was that by the twelfth day the surface of the unsoftened water in the reservoirs, though daily renewed, was covered with masses of confervæ to such an extent, that scarce a square inch could be found clear, and a powerful stench of decaying vegetable substance was evolved. Complaints of the water soon followed, and the experiment was discontinued.

In the course of the discussion Mr. Braithwaite put forward objections to the application of Dr. Clark's method of purification, on the ground that a certain amount of lime was necessary for maintaining the functions of animal life, and cited, in support of his argument, experiments made by Liebig, upon pigeons and cows. But, the quantity of lime supplied in solid food is much more than adequate to these requirements; in many districts, the water consumed by large populations, and by great numbers of cattle, is soft water, with a very small amount of lime in any state; and further, the lime salt, required for the formation of bone, is not carbonate, but phosphate of lime, which is never present in water to more than an infinitesimal amount. Moreover, the experiments cited by Mr. Braithwaite are quite inapplicable to the case in question, because, in those experiments, lime was entirely abstracted from the solid food, as well as from the water supplied to the animals.

CONCENTRATION.

BY MR. A. F. HASELDEN.

Concentration is so entirely in the ascendant at the present time, that the more one dwells upon the subject, the more interesting it becomes; and the greater the desire to offer a few remarks thereon. On this side or that, or indeed whichever way one may chance to turn, concentration or condensation is everywhere more or less predominant. With institutions, societies, mercantile establishments, and even governments, it is conspicuous, and two or more offices are not unfrequently amalgamated into one. With literary productions, the three-volume work appears but occasionally as a memento of former days, compressed, as it now is, into the shilling and eighteenpenny edition. With railway and steam-boat excursion trips, the condensing principle is so strongly enforced, that pleasure becomes comparative pain, and the original expenditure is prudently augmented by the additional outlay of a life assurance ticket. In the dietetic department, glaze, meat biscuits, essences of coffee and tea, and last, though not least, the condensed egg, are among the numerous every-day offerings. But, above all these, Pharmacy stands prominent in its highly concentrated position, and in drawing the attention of the medical and pharmaceutical portions of society to this particular branch, no apology can surely be necessary.

* Report of the Government Commission on the Chemical Quality of the Supply of Water to the Metropolis. Presented to Parliament by her Majesty's command.

There is scarcely a single pharmaceutical establishment of any, or indeed of no notoriety, which has not its list of concentrated preparations, its essences, its inspissated juices, its liquors, its concentrated infusions and decoctions, and even its condensed powders. Up to a given point, these carry with them as an introduction a certain amount of merit, skill, and usefulness. To the traveller and economist they offer indisputable credentials of valuable importance, as a matter of convenience and reduced expenditure. It is not now the intention to offer an opinion upon their merits as remedial agents, or whether these preparations equal those they are intended to represent. They have their admirers, their supporters, and their opponents. Condensed castor-oil, concentrated black doses, and condensed Gregory's powder may, and often have caused a sceptical and incredulous smile; and there, so far as they are concerned, the matter may safely rest.

But now pass on to the consideration of some recent preparations, partaking in a degree of the concentrated form, but of a more serious character. Can the same complacency, the same comparative indifference be indulged in, when the introduction into practice, for internal exhibition, of some of the most powerful medicinal substances, *dissolved in oil*, is dwelt upon?

One difficulty which presents itself, is the fact that the quantity of the active ingredient dissolved, is not upon all occasions specified, thereby leaving the prescriber in ignorance as to the real dose he is ordering. It is true that the adult minimum dose of these compounds is mentioned, but it should be borne in mind that the quantity which might be prudent in one case, might not apply equally well to another; and, further, as every chemist is at liberty to prepare them, and most certainly will, should there be a demand for these combinations, unless some recognized strength be agreed upon, and stated upon each label, as has hitherto been the plan with new chemical compounds, there will unavoidably be a variety of strengths, to the bewildering of the prescriber, the confusion of the dispenser, and the danger of the patient. With all new chemical compounds, when used as remedies, the quantity of the active ingredient in solution should be plainly and frankly stated. The introducer would have the advantage of the start, the merit of the invention, and, in all probability, the largest demand for the article, and therewith should be content.

May it not, without prejudice, be confessed that a doubt as to the probable result of such preparations is entertained, and may not the possibility of equalizing the dose in such a vehicle be justly open to inquiry?

Such notions may at first appear crude and imperfect, but not unworthy of consideration; for, even under the sanction of men of great and undoubted reputation, favourite remedies and cherished theories have so often flourished for a season, and then disappeared, that the application of such potent agents in such a guise may well be weighed in the balance ere they are freely adopted. A result also plainly discernible, to which the system of concentration has led, is the condensed mode of prescribing, adopted in the present day by a large portion of the profession; a practice open to many objections, and which, expediency, under particular circumstances, would alone seem to justify. This too has emanated chiefly from the pharmaceutists themselves, who, when they reflect upon the consequences, shake their heads with disapprobation, and, Frankenstein-like, would fain escape from the object of their own creation; for who amongst them has not in secret sighed over the remembrance of departed draughts—whose visits now, like those of ministering spirits, are few and far between,—or the daily decoction, and the old-fashioned, good-sized mixture, now transformed into a mere shadow of its former self, and even this changed into a small bottle of tincture, or the Lilliputian quantity of some powerful liquor.

Such preparations as Liquor Arsenicalis, Liquor Potassæ, Liquor Quinæ Amorph., Liq. Cinchonæ, Acidum Nitro-muriaticum, Tinctura Ferri Sesquichloridi, Tinctura Ergotæ, and many others, might with advantage and convenience to

the consumer, receive a reasonable amount of dilution at the hands of the dispenser, diminishing the uncertain and irregular administration of medicine by drops, and the risk of accidental over-doses. These are but passing thoughts, but, with the aid of others, it is hoped they may assist in bringing about a more healthy condition of Pharmacy and Pharmaceutists.

18, *Conduit Street*, *May* 10*th*, 1856.

NOTES ON THE MERCURY OF NEW ALMADEN, CALIFORNIA.

BY W. S. W. RUSCHENBERGER, U. S. NAVY.

The quicksilver mine of California is in Santa Clara county, twelve miles from the town of San José, which is fifty-four miles from the city of San Francisco. It may be reached by three routes; one by stage coach exclusively; one by way of Oakland, opposite to San Francisco, to which you are conveyed by a steamer in an hour, and then you take a stage. The third route is by steamer to Alviso, seven miles from San José. The roads are good, but in the dry season of the year horribly dusty.

Recently a good hotel has been established, where the traveller is comfortably entertained, but not cheaply. Near it is a spring, which reminds one of the waters at Saratoga. It is anticipated that this spring will attract visitors and invalids during a considerable part of the year, and it is for their accommodation the hotel has been prepared.

The mining company has built this house, and a number of neat cottages for the accommodation of the engineers, mechanics, and others connected with the works. The whole is known under the name of New Almaden.

The hotel is just at the entrance of a mountain gorge, and is said to be about 400 feet above the level of the sea. The entrance to the mine is 700 or 800 feet higher, or about 1200 feet above the ocean. From the summit there is a fine view of the valley of San José, which is a fertile plain (when it rains) of many miles in extent, shut in by ranges of hills of about 1200 or 1300 feet elevation. When the atmosphere is clear, as it generally is, shipping in the magnificent bay of San Francisco may be discerned from the heights of New Almaden.

This mine was discovered in 1843 or 4 by a Mexican, Capt. Castellero, of Santa Clara. The Indians were in the habit of painting their persons bright red; the source of this pigment they kept secret, but the captain stealthily followed an Indian to it, and thus it became known. Such is the story.

The working of the mine was begun in the year 1846 or 7, by an English Company, but from some reasons was not profitable. In 1849 or 50, it fell into American hands, and now yields about 30,000 flasks annually.

The present entrance of the mine is by a horizontal shaft (drift), which, with a railway, penetrates the hill 1200 feet. From this, several passages, some seven or eight feet in diameter, made by removing the cinnabar, dip. The greatest depth from the surface at present attained is said to be 400 feet.

The ore is freed from its natural position by blasting, and by pick and shovel. The miners, native Mexicans, carry the ore in hide-sacks on their backs to the railway, by which it is brought into the open air, where it is assorted. The rich compact ore, in masses of from three to twenty pounds weight, is separated from the small fragments found mingled with what resembles common yellowish earth or clay. The several kinds are packed in coarse hempen sacks, which are conveyed in four horse waggons, a mile and a quarter down the steep hill, to the smelting works.

The yellowish clay-like matter is converted into oblong masses, resembling large bricks in form, by the addition of water, and dried in the sun. The object of making these "adóbés" will be understood presently.

The apparatus for smelting the ore is simple. A kind of reverberatory furnace, three feet by five, is arranged at the extremity of a series of chambers of nearly, if not exactly of the same dimensions, namely, seven feet long, four wide, and five high. There are eight or ten of these chambers in each series: they are built of brick, plastered inside, and secured by iron rods, armed at the ends with screws and nuts, as a protection against the expansion by heat. The tops are of boiler iron, luted with ashes and salt.

The first chamber is for a wood-fire. The second is the ore chamber, which is

separated from the first by a network partition of brick. The flame of the fire passes through the square holes of this partition, and plays upon the ore in the ore-chamber, which when fully charged contains 10,000 lbs. of cinnabar. Next to the ore-chamber is the first condensing chamber, which communicates with it by a square hole at the right upper corner; and the communication of this first with the second condensing chamber is by a square hole at the left lower corner. An opening at the right upper corner of the partition, between the second and third condensing chamber, communicates with the latter. The openings between the chambers are at the top and to the right, and at the bottom and to the left alternately, so that the vapours from the ore-chamber are forced to describe a spiral in their passage through the eight condensers. The vapour and smoke pass from the last condensing chamber through a square wooden box eight or ten feet long, in which there is a continuous shower of cold water, and finally escape into the open air by tall wooden flues.

The floor or bottom of each condensing chamber is about two feet above the ground, and is arranged with gutters for collecting the condensed mercury and conveying it out into an open conduit, along which it flows into an iron receptacle, from which it is poured into the iron flasks, through a brush, to cleanse it of the scum of oxide formed on the surface on standing. Seventy-five pounds weight are put into each flask.

There are fourteen of these furnaces and ranges of condensers, with passages of eight or ten feet in width between them. A shed is constructed above the whole at a sufficient elevation to permit free circulation of the air.

It requires sixty hours to exhaust each charge of cinnabar (10,000lbs.). The fire is so regulated as to keep it uniformly at a red heat.

The cinnabar, either in irregular masses or the finer particles worked up into the "adóbés" before mentioned, is piled in the ore-chamber, very much after the manner of arranging bricks in a kiln for burning.

The subtle nature of mercury is such that, notwithstanding the means here used to secure it, not a little escapes through the flues and the lutings. The roofs around are black with mercury, condensed in exceedingly minute globules. They may be detected in abundance by a hand microscope in the soot taken from the flues. The bricks which enter into the structure of the condensing chambers very soon become saturated with mercury, and will yield a profit by being worked like the ores.

On examining the box or trough of one of the series which had not been in operation for several weeks, I observed that its perpendicular sides were lined to the depth of about one-eighth of an inch with a coat of mercury, which on being touched by the finger aggregated itself into globules, and ran down to the bottom in a tiny stream. This had been condensed by the shower through which the vapours necessarily passed to escape by the flues. The waste water is conveyed in a covered conduit about fifty yards, and at that point flows down the hill-side. This conduit —a wooden box four inches square—is lined by a black deposit, which consists of mercury in minute globules. A barrel stood at the extremity of the conduit, and was full of this waste water. I was assured that it had not been disturbed for a considerable time, probably two months.

An eagle ($10), held just under the surface of this water during a minute or two, and then rubbed with a finger, revealed the presence of mercury. The stars on the coin were of a bright silver white.

I filled a bottle from the barrel and brought it on board the ship.

I repeated there the experiment with the coin, and also with a slip of bright copper, but they exhibited no visible evidence of the presence of mercury.

A drop of the water spontaneously evaporated from a glass slide, left a stain which was shown, under (about 450 diameters) my microscope, to consist of fine globules of metallic mercury.

By evaporating the contents of a watch crystal spontaneously, the view was brilliant by reflected light, compared by one of the observers to the starry canopy of a clear night.

I found by comparison that the globules in good mercurial ointment were four or five times as large as those left by the Almaden water after evaporation.

Lime water produced a copious precipitate, which, collected on a filter, and then submitted to the blowpipe on charcoal, yielded a very strong horse-radish odour.

Very slight precipitate was produced by a solution of chloride of barium, even after standing twenty-four hours.

The presence of selenium is inferred.

The slag or ore, after having been submitted to the action of the furnace, was placed on charcoal with soda, and subjected to the flame of a blowpipe. The horse-radish odour was very marked.

The slag, powdered and dissolved in aqua regia, gave a reddish-brown precipitate on the addition of ammonia, which is presumed to be selenium.

Del Rio announced the presence of this mineral in the quicksilver ores of a mine in Mexico. I believe from the very limited examination I have been able to make of it, that the cinnabar of New Almaden contains selenium.

The suspension of metallic mercury in water, in a state of minute division, is new to me. The specific gravity of the metal is so great, compared with water, that I should have said that it would subside very speedily on standing.

The specific gravity of the waste water of New Almaden, indicated by one of Dr. W. H. Piles's carefully made hydrometers, was 1.002.

Men and other animals employed about the smelting works are obnoxious to salivation and to mercurial affections. But those who dig the ore enjoy health.

It is a desideratum to discover a means of cooling to a low temperature the condensing chambers, which will be at the same time simple and cheap. Labour is at from three to five dollars a day, and when combined with any special intelligence, at a much higher rate. Therefore the means of refrigeration should not be complicated, or of a kind easily put out of order.

It is believed that the addition of lime to the kiln, or in the condensing chambers, would increase the yield of mercury, but not to an extent sufficient to pay the cost of the lime at New Almaden.

The outside temperature is from 70° to 90° F., so that it is not easy to keep the condensing chambers cool by the circulation of atmospheric air. The sulphurous or sulphydric acid eliminated prevents the circulation of water in iron tubes from being resorted to.

May not the selenium exercise an influence, catalytically or otherwise, in the smelting process ?—*American Journal of Pharmacy.*

CONDITIONS OF SUCCESS, AND CAUSES OF FAILURE IN PHOTOGRAPHY.

Babo* has made a number of experiments relating to this subject. His results lead him to the opinion that absolute neutrality of the substances employed in producing the film of iodide of silver, is an essential condition. The collodion may be defective in this respect, a trace of free acid causing a decomposition of the iodine compound, and thus affecting the sensibility of the film of iodide of silver. The addition of finely divided silver to the collodion in order to remove free iodine, is not always attended with success, and after some time, silver decomposes the collodion, in the presence of iodine or iodide of potassium, rendering it thin and useless, a precipitate also being formed, containing, besides organic substance, iodate of silver. Again, the neutralization of the free acid by means of alkali, is very difficult of execution.

Babo finds that different compounds of iodine differ in the decomposing influence exercised by them upon collodion, and that this influence varies for the same compound, according to the proportions of ether, alcohol, and water, in the collodion. The greater the amount of the two former substances, the more durable is the collodion. He finds that for this purpose the most stable of the iodine compounds is the iodide of tetræthylamine. This is probably owing to the fact that, in the decomposition of this substance, iodic acid is not formed, but triodide of tetræthylamine, which is less readily decomposed. The collodion prepared with iodide of potassium or of ammonium, is rendered much more stable by diluting it with ether and alcohol, adding a little iodide, and then boiling, previously to the addition of the whole of the iodide, with some pure urea, in an apparatus that admits of the ether being condensed and flowing back. By this means, any trace of nitric acid is

---

* *Berichten u. d. Verhandl. d. Gesell. für Beförd. d. Naturwiss. zu Freiburg*, 1855, and *Ann. d. Phys. u. Chem.*, xcvii., 499.

removed. The collodion, which may in this operation have become slightly yellow, is then to be agitated with silver, and, when decolorised, decanted or filtered and mixed with the proper quantity of perfectly neutral iodide of potassium. A very sensitive preparation is thus obtained. It might indeed be advantageous before dissolving the cotton, to boil it with a solution of urea.

The absence of any reducing substance is quite as essential as the neutrality of the collodion; aldehyde, sulphurous, pyrogallic, and formic acids, sulphuretted hydrogen, alloxantine, protoxide of iron, retard or neutralize the action of light. This would appear to account for the fact that collodion loses sensibility when kept long, for by the liberation of iodine, aldehyde is formed. It follows, moreover, that the alcohol and ether used in the preparation of collodion should be freshly distilled over caustic potash.

The presence of iodate of silver in collodion almost entirely prevents the action of a faint light, and as this salt is formed by the action of iodine upon nitrate of silver, this is another cause of the slight sensibility of collodion containing free iodine.

When nitrate of silver solution is mixed in the dark with iodide of potassium in excess, then exposed to light and mixed with pyrogallic acid, no immediate reduction takes place. Further, iodide of silver precipitated with excess of iodide of potassium, collected on a filter and washed in the dark, is not sensitive. But when the amount of iodide of potassium mixed with the silver solution is insufficient to precipitate the whole of the silver, there is an immediate reduction of silver on the addition of pyrogallic acid. The same result takes place when pure iodide is mixed with some nitrate of silver, provided the amount is too small to determine the solution of any iodide, in which case the sensibility of the substance is reduced.

This circumstance is undoubtedly not only a frequent cause of failure, but also of uncertainty in the character of the picture produced. The quantity of silver, not converted into iodide, that is taken up by the collodion film, depends upon circumstances which are not always to be controlled. Among these, the strength of the silver solution, and the amount of iodine compound in the collodion are of prominent influence, but phenomena of diffusion must likewise be concerned within certain limits. The interchange of substances between the collodion and silver solution must be very complicated, dependent upon the amounts of alcohol and ether, indirectly upon the temperature, and upon the amount of undecomposed silver solution taken up, according to the nature of the iodine compound used. Babo is of opinion that in this respect a more certain result is obtained with ethylamine or urea salts, than with salts of potash or ammonia. He found collodion prepared according to the following formula, very suitable for silver solution, containing from eight to nine per cent. of silver salt :—

Pyroxyline	1	.....	—
Alcohol (80 per cent.).....	30.0	.....	40.0
Ether.....	50.0	.....	60.0
Iodide of tetræthylamine	0.5	.....	1.0

For developing the picture.

Water	100
Alcohol.....	20
Acetic Acid	30
Pyrogallic acid...	1

Attempts to substitute aldehyde, ammonia, alloxantine, phosphorous, acid, &c. for pyrogallic acid, proved unsuccessful. The best result was obtained with protosulphate of iron mixed with a few drops of phosphorus acid, but this liquid has the disadvantage of attacking the shadows, which is not the case with pyrogallic acid.

REMARKS ON SILICIUM.

BY F. WÖHLER.

Silicium is unquestionably one of the most remarkable of the elementary substances, because it constitutes so large a part of the earth; and for this reason it is desirable to obtain the most complete knowledge of its characters.

Silicium was first obtained by Berzelius in 1824, by the decomposition of fluoride of silicium, or of the fluosilicate of potassium, with potassium. He obtained it only in the amorphous condition as a brownish powder, without lustre; and it is but recently that Deville has, in the course of his experiments upon aluminium, obtained pure crystallized silicium in a state analogous to that of graphite.*

I have accidentally become acquainted with a mode of obtaining silicium in this

* *Ann. Chem. Phys.* [3] xliii., 31.

state. In the preparation of aluminium from cryolite, by means of sodium, as recommended by H. Rose,* I used ordinary Hessian crucibles, and when the experiment was successful, obtained, besides malleable globules of aluminium, brittle globules containing a black crystalline substance, which remained, when the metal was dissolved by hydrochloric acid, as dark, iron-grey laminæ, with metallic lustre. This substance proved to be the silicium obtained by Deville.

It appeared that, in the operation, fluo-silicate of sodium must have been formed, and that silicium was eliminated from this substance by aluminium ; subsequent experiments have confirmed this opinion.

In order to obtain silicium in this state, a mixture of aluminium with twenty or forty times its weight of dry fluo-silicate of sodium or of potassium, is heated, in a Hessian crucible, to the melting point of silver, and the mass kept in a liquid state for about fifteen minutes. When the whole has cooled, the crucible is broken, and the compact, whitish or greyish slag separated from the iron-grey regulus. The latter consists of a compound of aluminium with silicium, and contains a large amount of crystalline silicium. This mass is quite brittle, and has a coarse laminar fracture, dark iron-grey colour, and metallic lustre. It is crushed, digested with hydrochloric acid for the purpose of extracting aluminium, and then with moderately strong hydrofluoric acid to remove silica, that seems to be formed by the solution of the compound of aluminium and silicium by hydrochloric acid, the residual crystalline silicium is then washed and dried.

In several experiments, the siliceous aluminium obtained, amounted to 70 or 80 per cent. of the aluminium used, and these reguli contained from 65 to 75 per cent. of crystalline silicium. The aluminium would appear to determine the crystallization of the silicium in the same manner that melted iron determines the formation of graphite from amorphous carbon.

Silicium appears in this state as perfectly opaque, crystalline laminæ, with metallic lustre ; it is very similar to the native graphite, and to that from iron furnaces, although, when placed by the side of graphite, its lustre appears more metallic, and the colour has a tinge of blue. It gives a dark brown powder.

When an excess of aluminium is used, or when the mass is not maintained in a state of fusion so long, the regulus obtained does not contain so much silicium, but it is then obtained as separate crystals, which are sometimes situated at the surface with the form of six-sided plates, the solid angles of which are often rounded, as in diamond.

Silicium is very hard, scratches glass, but not topaz. Its specific gravity is 2.490 at 50° Fahr., so that it is lighter than its oxygen compound, the specific gravity of rock crystal and other varieties of quartz being given as 2.6 or 2.8.

According to Deville's observations, it is a perfect conductor of electricity. He also found that the crystalline silicium may be heated to whiteness in a current of oxygen without burning or change of weight. This high degree of stability, which was observed by Berzelius to be characteristic of the ignited pulverulent silicium, I am also able to confirm ; the crystalline silicium even when heated to the most intense whiteness by the flame of alcohol fed with oxygen, does not undergo the slightest oxidation or diminution of lustre ; it appears also to be quite as infusible as carbon. On the contrary, it presents the singular character of decomposing carbonic acid when ignited with alkaline carbonates, eliminating black carbon and carbonic oxide, while it is converted into silica. This character was observed by Berzelius in the amorphous silicium.

Crystalline silicium like amorphous silicium is not acted upon by any acid ; it is dissolved by a moderately concentrated warm solution of potash or soda, with simultaneous evolution of hydrogen ; the solution is complete, but proceeds slowly. Chloride of ammonium precipitates silica from the solution.

When the crystalline silicium is heated to ignition in a glass bulb over a spirit-lamp, in a stream of dry chlorine, it burns completely, forming liquid chloride of silicium, which gives gelatinous silica when mixed with water.—*Annalen der Chemie und Pharmacie*, xcvii., 266.

* In preparing aluminium by this method, it seems advantageous to heat the cryolite previously with one-quarter or one-third its weight of dry chloride of ammonium, by which means one-third of the fluoride of sodium is converted into chloride of sodium, with evolution of fluoride of ammonium, and a mass is obtained that melts more easily than cryolite. By this treatment, chloride of aluminium is not formed.

CHARACTERS OF THE FLAME OF BISULPHIDE OF CARBON.

In most kinds of flame red and yellow light preponderate so largely, that the chemical and fluorescent action is very small. Babo and Müller* find that the flame of a mixture of binoxide of nitrogen and bisulphide of carbon differs in this respect from others. Quinine-solution, fluor-spar, solution of chlorophylle in ether, and uranium glass, illuminated by this flame, present the phenomena of fluorescence in a high degree.

The prismatic analysis of this light gives a perfect spectrum, in which the violet portion is unusually intense. The spectrum does not present black lines, but three bright lines, two in the yellow and one in the green, one of the former being the brightest and one faintest.

This flame was found to have a very powerful photographic action. Distinct pictures could be obtained on collodion by exposure for one second, when the object was from a foot to a foot-and-a-half from the flame, with a consumption of two litres of the mixture, while the flame of coal-gas in an argand burner fed with oxygen in the centre, produced no effect within ten or fifteen seconds. Drummond's lime-light produced only a faint effect, and the flame of phosphorus in oxygen produced in ten seconds an effect only equal to that of the mixture in one-and-a-half second.

The greater action of this light might be partially owing to the quantity of light generated by the rapidity of the combustion, but experiments with a regulated flame one-and-a-half inch long, showed that the photographic action was, after ten seconds, nearly as great as that of the flame of phosphorus in oxygen, and consequently, that the chemical energy of this flame is not proportionate to the luminous intensity, and is much greater than that of any flame hitherto examined.

FORMULÆ FOR THE INTERNAL ADMINISTRATION OF CHLOROFORM.

BY M. DANNECY.

(*L'Union Méd., April*, 1855.)

M. Dannecy employs oil to dissolve the chloroform. The formula he uses is as follows:—Take of pure chloroform, 2 grammes; oil of sweet almonds, 8 grammes; gum arabic, 4 grammes; syrup of orange flowers, 30 grammes; distilled water, 60 grammes. Mix the oil with the chloroform, and make with the mixture an oily draught, in the ordinary way. When gum alone is employed to suspend chloroform in a draught, separation of the latter sooner or later takes place; and where alcohol is used, as by many practitioners, in proportion of one part chloroform to four parts alcohol, an excitant is introduced which may not be desirable, and if the quantity of chloroform prescribed be considerable, this objection is a serious one. The advantages which M. Dannecy sees in his formula are—1. That a perfectly homogenous and stable mixture is produced, whatever be the proportion of chloroform prescribed; 2. That no excitant like alcohol is introduced into potions which are most frequently intended to be calmative; 3. That it dispenses with every kind of precaution on the part of the patient, or those who have the care of him in administering the remedy. He thinks further that the mixture of the chloroform with the oil, without any detraction from the limpidity of the latter, is a test of the purity of the chloroform.

The Commission of the Société de Pharmacie,† while admitting M. Dannecy's formula as rational, proposes the following:—Chloroform, 2 or 4 grammes; sugar, 12 grammes; gum arabic, 5 or 10 grammes; water, 100 grammes. The chloroform is added to the sugar in a mortar, then the gum is added, and lastly, by degrees, the water. M. Deschamps, in commenting on the several formulæ which have been suggested, considers that of the Commission as preferable both to that of M. Dannecy and of M. Wahu, who dissolved chloroform in three or four parts of alcohol, and then mixed it with a solution of gum, on the ground that submitting all patients to the action of much alcohol or oil is not a matter of indifference. It is true that, after a time, a whitish flocculent deposit takes place, but a little shaking restores the appearance of the mixture. M. Deschamps proposes another formula—viz.. Chloroform, 2, 4, 6, &c., grammes; syrup, 30 grammes; yolk of one egg; water, 150 grammes. Dilute the yolk of egg with the water, and strain; weigh the syrup, then the chloroform; add the strained liquor, and shake the whole together.—*Medico-Chirurgical Review*, p. 238. Jan., 1856.

---

* *Berichten ü. d. Verhandl. d. Gesell. für Beförd. d. Naturwiss. zu Freiburg*, 1855, and *Ann. d. Phys. u. Chem.*, xcvii, 508.

† *Bull. Gén. de Thérap.*, p. 73. July, 1855.

ON THE EMPLOYMENT OF HYPOSULPHITE OF SODA IN ANALYTICAL CHEMISTRY.

BY DR. W. VOHL.

The author recommends, with Himly, the more frequent employment of hyposulphite of soda in analysis, instead of sulphuretted hydrogen. According to him, it can also be used to evolve sulphuretted hydrogen: if a piece of zinc is placed in dilute hydrochloric acid, and a few drops of a solution of hyposulphite of soda added, sulphuretted hydrogen is evolved. If now to this mixture a solution of a salt of lead, bismuth, cadmium, &c., is added, the sulphurets of the corresponding metals are precipitated.—*Ann. der Chem. und Pharm.*, vol. xcvi., pp. 237 to 243.

THE STARCH OF FRITILLARIA IMPERIALIS AS A SUBSTITUTE FOR POTATO STARCH.

Bosset* recommends the bulbs of fritillaria imperialis as a source of starch in the place of the potato. He states the per-centage composition of the bulb, compared with that of the potato, to be:

	Bulb of fritillaria imperialis.	Potato.
Water	68	70
Starch	23	20
Soluble substances	5	4

The fritillaria is perfectly acclimatized in the south of France, and the produce for a hectare is 19,800 kilogram. of bulbs, equivalent to 4500 kilogram. of starch.

SYRUPUS FERRI IODIDI.

BY MR. JAMES HOULTON.

For three or four years I have adopted the following method of making Syr. Ferri Iodidi, as the most simple, easy, and convenient. No fire is required, and it may be produced as pale as water in ten or fifteen minutes. It may not be generally known; therefore, if you think it worth insertion in your valuable Journal, please to give it a place in next number:—

Syrupus Ferri Iodidi (made without heat).

Iron Filings (washed clean), gr. 126 or more.
Iodine, gr. 252.
Distilled Water, 2 oz.

Mix together in a flask, shake until colourless, and filter the solution into

Simple Syrup (thick), f℥x.

N.B. f℥xij. should weigh one pound avoirdupois.

Wetherby, Yorkshire, May 21, 1856.

ON THE PREVENTION OF THE OXIDATION OF METALS.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—Those familiar with electrical science are well acquainted with the fact that zinc exercises positive relations with regard to most other metals. In other words, it possesses the power of keeping them in a negative state when in contact with them.

In this negative state they are incapable of entering into combination with oxygen, and this circumstance may be applied with much advantage to the prevention of the oxidation of machinery, especially such parts of it as, in the case of marine engines, are liable to come in contact with water. Many instances will at once suggest themselves in which much manual labour might be saved by the simple contrivance of appending either a ring or slip of zinc to the metal to be preserved bright. It would be especially applicable in the case of bayonets

* *Comptes Rendus*, xxxvi., 299.

and rifle barrels, and a zinc edging to a scabbard would prevent the rusting of the sword.

I have employed this method for some years with perfect success in the case of articles of polished steel, which, for the sake of experiment, were placed in precisely similar circumstances with others not so protected, and retained their brilliancy, while the others became rapidly covered with a thick coating of oxide. The useful properties of "galvanized iron," *not* improperly so called, are due to the same cause.

Trusting this may prove useful to some of your readers,

I remain, yours respectfully,

H. Draper.

Dublin, May 21.

SELECT COMMITTEE ON ADULTERATION OF FOOD, DRUGS, &c.

(*Continued from page* 526.)

April 16*th.*—Mr. T. K. Callard, baker, Durham Terrace, St. John's Wood, stated, in reference to the use of alum in bread, that he had been ten years in the business, and had never used a particle of alum in making bread. He was not peculiar in this respect, having received forty-three letters from bakers in London, who were prepared to state upon oath that they did not use alum. Witness thought that a large proportion of the trade were anxious that something should be done to prevent the use of alum, if it could be done without checking improvements also. As the law stood at present, the baker who made the "unfermented bread," which was considered by many medical men as the most wholesome, was liable to fine and imprisonment.

Mr. Robinson, Judd Street, baker, stated to the Committee that, in order to test Dr. Normandy's accuracy, he had sent to the doctor a sample of flour and two loaves, one perfectly pure, and another containing alum in the proportion of 1 oz. to 16 lb. of bread. After analyzing them, *Dr. N. gave him a certificate, stating they were all perfectly pure*, and that witness was one of the few bakers in London whose bread was not adulterated. Since then Dr. N. had written to him, stating that he had discovered alum in his bread, and threatening to expose him.

Mr. Clapperton, of 11, Mortimer Street, Cavendish Square, said he had been mentioned in the *Lancet* as one of the bakers who sold adulterated bread. This statement had ruined his business, and obliged him to give it up. Dr. Hassall had written a letter exonerating him from it, but on application to Mr. Wakley for a portion of the bread said to have contained alum, it was refused. Witness was therefore advised that an action could not be sustained.

April 27*th.*—Mr. John Jackson, a miller, near Wakefield, said he was a member of a firm which had been prosecuted for vending adulterated flour, but the result of the trial was to prove that the charge was unfounded; was of opinion that a moderate inspection of mills was desirable, but the inspector should be thoroughly competent, capable of distinguishing between the various kinds of flour; for instance, the American flour sometimes arrived in a very warm state, it was put on the quay in the barrels for a few days, when it cooled, and would then keep for two years; but if an unqualified inspector saw it in the warm state he might condemn it as unfit for food, and perhaps confiscate £10,000 worth of property.

Mr. Richter, analytical chemist at Messrs. Savory's, had had considerable experience with regard to the law affecting Chemists and Druggists in Germany. About thirty or forty years ago the state of things in Germany was similar to that in England, but by the introduction of a law tending to raise the education of Chemists, he believed the adulteration of drugs was abolished. He thought part of this law might with advantage be introduced into England, and considered the Pharmaceutical Society was already a very important institution for the accomplishment of this object. He thought it also a very important matter, that the difference now existing between the Pharmacopœias of London, Edinburgh, and Dublin should be abolished; the variation in the strength of many of the preparations being a very serious evil.

Mr. Stafford Allen, drug-grinder, said he believed the public had been much abused by the evidence given before the Committee with respect to drug-grinders.

In 1833, when his firm was established in London, it was the general wish of the wholesale drug trade for the establishment of some grinder in whom they could have confidence. He was not prepared to say that dishonest grinders did not exist, but grinding was carried on in a much better way at present. What was called the 4 per cent. system he had never adopted, as he considered it unfair to both parties. Composite powders he had also from the first refused to make or sell. Witness thought that no benefit would be derived from legislative interference between the retail Druggist and the consumer; the public were supplied with drugs in so pure a state that very little improvement could be made.

April 30th.—Mr. Goodman, Chief Clerk to the Lord Mayor, stated, that in thirty years' experience in the legal business of the city, he had never had a case of adulteration brought before him, but was acquainted with the general law relating to adulteration. There were three remedies open to the public, viz., by action, by indictment by simple conviction before a magistrate, and by the intervention of the Excise. Unless there was some public injury arising from the adulteration, the only remedy would be by action. This referred to the general subject of adulteration. With the view of preventing adulteration he would suggest a right of search, either by inspectors appointed for the purpose, or by parties connected with the police. As to the adulteration of drugs, he thought they might be submitted to some analytical Chemist.

Dr. Bingley, Professor of Chemistry to the Medical and Surgical Institution, Sheffield, detailed various substances in which he had detected adulteration, and was of opinion, from circumstances that had come to his notice, that some alteration was required in the present law with regard to the adulteration of flour, in order to prevent those who took the samples from the trader from adulterating the flour before the analysis.

Mr. Postgate, in continuation of his evidence given on a former occasion, said, the general result of his examinations of articles in various large towns, was to convince him that adulteration existed in two-thirds of them. He proposed as a remedy that all injurious adulterations should be declared illegal, and the seller held responsible; that some central body should decide from time to time what were injurious adulterations, and that an officer, practically acquainted with genuine commodities, be appointed by the local authorities, subject to the approval of the Central Board.

May 2nd.—Dr. Hassall gave some additional information, illustrated by numerous diagrams, showing the appearance of various adulterations as seen by the aid of the microscope. He observed, that not long since it was thought impossible to detect the difference between roasted coffee and roasted chicory; by the aid of the microscope nothing was more easy; he had examined nearly every vegetable substance under the microscope, and in every instance had detected adulterations where they existed, even when the substances had been reduced to powder. Referring to the adulteration of bread and flour, witness quoted the opinion of Baron Liebig as to the injurious effects of alum on the phosphates contained in wheat; if white bread were required it could be produced by the use of lime water in small quantity, which would not be injurious. Dr. Hassall produced to the Committee specimens of coloured confectionery, purchased within the last few days, also samples of tea, containing large quantities of lie-tea. In addition to his former evidence on the adulteration of drugs, he mentioned liquorice, which was adulterated in various ways. Out of twenty-one samples of common extract of liquorice, every one was found adulterated with starch or flour, sugar, gum, &c.; the genuine extract dissolved without leaving any residue, but the impure left from 18 to 20 per cent. Refined liquorice was adulterated to a still greater extent; out of twenty-eight samples of powdered liquorice eleven were adulterated, but as this article was used chiefly for rolling round pills, the adulteration was not injurious to health. He referred to the adulteration of turmeric, powdered rhubarb, squills, colocynth, and aromatic confection, and produced samples of the drugs. The effect of the adulteration was to neutralize the efforts of physiologists, to determine the effect of certain quantities of various drugs upon the human frame. He believed that adulteration took place sometimes before importation, sometimes by drug-grinders, and, he was afraid, sometimes also by the wholesale and retail chemists; and it would of course be necessary to provide for each of these cases. In answer to a question from the Chairman, as to the possibility of any one person carrying on

twenty or thirty examinations a week of various articles, Dr. Hassall replied that one great advantage in the employment of the microscope, was the greater comparative rapidity with which results could be obtained. The number of examinations that could be made in a given time would necessarily depend in a great measure on the skill of the examiner and the nature of the article. But he was speaking within bounds in saying there was scarcely an article of consumption upon which he would not undertake to give satisfactory reports, to the extent of 100 samples a week. When chemical analyses had to be made, it would require a much longer time to prepare a report. Upon the question of adulteration, Dr. Hassall explained that selling one article in place of another did not constitute adulteration. This was substitution. Again, the presence of a foreign substance in an article, in consequence of imperfect preparation, was a simple impurity or contamination. An adulteration might be defined as the intentional addition of an article to any substance, the presence of which was not acknowledged in the name under which that substance was sold. It would be desirable to specify those adulterations which were prejudicial to health, and those which were simply commercial frauds. As to the remedy to be adopted, he was disposed to repeat his former opinions, adding a further suggestion, that it should be rendered imperative on persons convicted of giving false weight, or selling adulterated goods, that they should keep a placard, exhibited in the most prominent part of their windows for three, six, or nine months, containing the text of the judgment condemning them.

The Chairman said that the Committee had received a letter from Dr. Normandy, one paragraph of which the Committee had decided should be read. The paragraph was as follows :—

"I told him (Mr. Robinson) that these samples would be no proof of Messrs. Gilbertson's usual practice as bakers, but that I would call in a few days at his shop and choose a loaf there myself. I did so, and I never denied or affirmed that I analysed the samples which Mr. Robinson had brought me ; for, on account of the unsatisfactory result which the analysis of such samples would have given I kept no memorandum of it ; but from the certificate, which it appears Mr. Gilbertson holds, it seems I analysed them, and that this analysis agreeing with that of my own sample, I gave him the certificate in question."

The Committee then adjourned, and it was understood that no further evidence would be received, the next meeting being to consider the Report.

SHEEP OINTMENT.

SOUTHAM COUNTY COURT.—WILLS *v.* TOWERS.

We have received a report of an action, for damage done to sheep of the plaintiff, a farmer at Prior's Marston, Warwickshire, by the use of an ointment, supplied by the defendant, a shopkeeper in the same village. The sale of the ointment, and the result of its application having been proved,

Thomas Beesley, Fellow of the Chemical Society and Analytical Chemist, Banbury, deposed, that he analysed the ointment, and found it to contain, in 100 parts, 1 and $\frac{1}{5}$ parts of white arsenic, 12 parts of quicksilver, and the remainder grease. Had no doubt that such an ointment would produce the effects described. Mercurial ointment should consist of quicksilver and grease. Arsenic was an improper and dangerous addition, the use of which in any form was attended with risk. Many accidents had happened with the common sheep-wash, which contained much less arsenic than defendant's ointment.

Several witnesses were called for the defence, who spoke to the use of the ointment in several other cases, without injury arising therefrom.

Thomas Archer, Druggist, Southam, stated that he sold the ointment to defendant. Made it himself. It contained quicksilver, grease, and a little arsenic, which was added to make it stronger ; and he was sure could do no mischief. Had sold a great deal of the ointment, and the only complaint was of its being too weak. Had no doubt the injury arose from salivation, to prevent which the sheep should have been shut up, and kept from the wet.

The matter was then referred to an arbitrator, who was of opinion that the sheep had suffered, and the plaintiff was entitled to compensation—his award being, damages £10 ; which was confirmed, with immediate payment and costs.—*Banbury Guardian*, May 8th.

BOOKS RECEIVED.

A Handbook of Organic Chemistry; *for the Use of Students.* By William Gregory, M.D., F.R.S.E., &c. Fourth edition, corrected and much extended. London: Walton and Maberly, 1855. (From the Publishers.)

Since the publication of the third edition of this valuable manual (reviewed in this Journal, vol. xi., page 534), the progress of discovery in the department of organic chemistry has rendered necessary some corrections, and much additional matter. This has enlarged considerably the present volume, without, however, altering the original character of the work, which affords to the student a practical knowledge of the principles which regulate organic chemistry.

Charter, Constitution, and Code of Ethics, of the Maryland College of Pharmacy. Baltimore: John W. Woods, 1856. (From the President.)

Experimental Researches in Electricity. Thirtieth series. By Michael Faraday, Esq., D.C.L., F.R.S., &c.

On the Action of Non-conducting Bodies in Electric Induction. By Professor Faraday and Dr. P. Riess. (From the *Philosophical Magazine* for January, 1856.)

TO CORRESPONDENTS.

Obituary.—We have to announce with much regret, the decease of our valued Correspondent, Dr. Hamilton, who died on the 25th of May, after a short illness, at his residence, 14, Octagon, Plymouth.

S. B. B. (Wakefield).—We know of no cheaper or better hydro-carbon for the preservation of potassium than benzine.

M. P. S. (Sheffield).—Fumigating with sulphur is sometimes adopted by gardeners for killing the "red spider;" but it should be used with care, or the plants will suffer.

R. P. (Edinburgh).—Proceed as in preparing concentrated infusions.

R. J. F. (Mapleton).—Gutta percha is not soluble in spirit of wine. Benzole is the solvent generally used.

A Constant Reader.—Froriep on the Therapeutic Application of Electro-Magnetism (translated by Dr. R. Lawrence) would probably afford the information.

J. M. (Taunton).—Wheat steeped in a decoction of nux vomica is sometimes used by farmers for destroying vermin.

E. E. (Weymouth).—*Grains.* *H.* (Portsmouth).—*Vermilion.*

"*Caustic*" (London).—(1 and 2.) Beasley's *Druggists' Receipt Book.*—(3.) Any elementary work on chemistry.—(4 and 5.) We cannot answer the questions. The advertisement of manna by the perfumer would be worthy of notice, if an authentic copy of it could be obtained.

J. Q. (York).—We do not understand the question.

W. M. R. S.—"*The Chemist.*"

A Member (Exeter).—*Howards & Kent*, Stratford, Essex.

W. M. P.—The label forwarded is liable to stamp duty.

J. G. (Birkenhead).—(1.) There is no authorized formula.—(2.) *Essence of Rennet.* Fresh Rennet, 12 oz.; salt, 2 oz.; proof spirit, 2 oz.; white wine, a quart. Digest for 24 hours, and strain.—*Beasley.*—(3.) *Inks.* See vol. vii., page 182.—(4.) *Lavender Water.* Vol. iv., pages 99 and 243.

A.P.S. (Ludlow).—*Fluorescence of Solutions of Quinine.* See vol. xii., page 245.

H. D. (Dublin).—*Artificial Fruit Essences.* Vol. xi., p. 420.

F. A. C. (Rochdale).—(1.) The last edition of Thomson's *Dispensatory* was published in 1852. We are not aware that another edition is in progress.—(2.) Mucilage of quince seeds, or tragacanth.

A. B. (London).—*Benzoinated Zinc Ointment.* Vol. xiv., page 207.

T. (Hull).—Reading novels is not likely to promote the advancement of apprentices.

Messrs. Warren's communication, with enclosure, has been received.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, Secretary, 17, Bloomsbury Square, before the 20th of the month.

Advertisements (not later than the 23rd) to Mr. Churchill, New Burlington Street. Other communications to the Editor, 15, Langham Place

INDEX.

PAGE

Abraham, Mr., Concentrated Infusion of Senna 15
Acetate of Lead, Commercial (J. Mackay) 315
Acid, Arsenical Sulphuric, Purification of (A. Buchner) 39
—— Chromic 69
———— and the Chromates, Manufacture of 32
—— Cyanic, New Form of (Baron Liebig) 231
—— Hydriodic, Syrup of (J. Murdoch) 63
—— Hydrocyanic, Extemporaneous 423
———— Manufacture of .. 421
———— (Wittstein) .. 429
—— Pipitzahoic 375
—— Sulphuric, Note on the Testing of (Wittstock) 376
———— Purification of from Arsenic 375
—— Tannic, a Remedy for Chilblains (Prof. Berthold) 185
Acidification of Fats, Spontaneous (M. Pelouze) 40
Acids and Alkalies, diluted, of the Pharmacopœias (F. Kendall) 490
—— Diluted Mineral of the Pharmacopœias (P. Squire) 394
———— of the Pharmacopœia (R. W. Giles) 409
Aconite, Accidental Poisoning by ... 477
———— Letter relative to (C. H. Leet) 520
Aconitum Napellus and Cochlearia Armoracia, distinctive Characters of the Roots of (R. Bentley) 449
Action against a Bone-Setter.—Norris *v.* Crapper 479
Adjourned Meeting — Election of Council, 1856—57 543
Adulteration of Annatto 254
———— (A. H. Hassall) 295
———— Supplementary Remarks on (A. H. Hassall) 323
———— Bichromate of Potash 35
———— Beer with Cocculus Indicus, detection of 407
———— Drugs (Dr. Hassall and Mr. Redwood) 248
———— Letter on 189

PAGE

Adulteration of Annatto, Remarks on (J. Bell) 489
———— Food, Chemistry of Dr. Hassall) 233
———— and Drugs, Committee Meetings relative to at the House of Commons, 84, 126, 442, 520, 565
———— Remarks and Correspondence of Drs. Hassall and Letheby, relative to 97
———— and Physic, and the Pollution of Water 53
———— and Fraud, Remarks on 338
———— the *Lancet* 244
———— or Mixtures of Coffee and Chicory, Method of Detecting 286
Aërolite or Meteorite, supposed, found in the Trunk of an old Willow Tree in the Battersea Fields (Sir R. I. Murchison) 161
Alcohol from the Fruit of the Cactus 519
———— Production of from Couch-Grass (M. Rabourdin) 178
Algæ and other Plants, Employment of in the manufacture of Soaps (Chevalier de Claussen) 238
Alkaline Silicates, Chemical History of (M. Struckmann) 82
Allchin, A., Aquaria for the Preservation of Leeches 453
Almonds, Essential Oil of, Poisoning by 377, 430
Alum, Detection of in Bread, Letter on (J. Postgate) 325
Aluminium, Chloride of 336
———— and Iron, Alloys of (Prof. Calvert) 232
———— Manufacture of (M. St. Claire Deville) 71
———— Preparation of from Cryolite (H. Rose) 371
———— Position of in the Thermo-Electric Scale (G. Gore) 506
———— Voltaic Series (C. Wheatstone) 373
———— Specimen and Description of at the Polytechnic Institution 124
Analysis of the Medical Bill 51
———— Sanitary Commission 292

PAGE

Analytical Separation and Quantitative Estimation, Methods of ... 121
Andrews, T., Constitution and Properties of Ozone 183
Annatto, Adulteration of 254
———, ———(A. H. Hassall) 295
———, ———, Alleged, Remarks on (T. Redwood) 198
———, ———, Discussion on 303
———, ———, Supplementary Remarks on (A. H. Hassall) 323
Anniversary, Fifteenth, of the Pharmaceutical Society 536
Annoyance Juries 484
Annual Meeting (1856) of the North British Branch of the Pharmaceutical Society 496
Answers to Correspondents, *see* Correspondents, Answers to
Antimony, large Dose of (W. Procter) 351
———, Potassio-tartrate of, in Solution, Means of Preventing the Decomposition of 286
———, Purification of (J. Lefort) 227
Apothecaries and Druggists, Statistics of (W. Willmott) 188
Apparatus for taking the Specific Gravity of Floating Bodies, *with cut* (Mr. Stevenson) 493
Apprentices, Registered, List of, 3, 57, 197, 294, 393, 447, 486
Aqua Lauro-Cerasi, &c., Suggestion to substitute for Hydrocyanic Acid (A. F. Haselden) 468
Aquaria for the Preservation of Leeches (A. Allchin) 453
Archer, T. C., Indian Gums 15
———, Useful Products from the Natural Order Palmaceæ, Lecture on 263
——————— of the Natural Order Graminaceæ 548
Archil, Method of Testing (Mr. Leeshing) 40
Arsenic, Detection of, in Cases of Poisoning (A. Buchner) 39
———, Suspected Case of Poisoning with 140
Arsenical Sulphuric Acid, Purification of (A. Buchner) 39
Artificial Oil of Cassia, Preparation of (A. Strecker) 180
——— Production of Essence of Mustard (Berthelot & S. de Luca) 180
Australian Medicinal Plants 114

Bank Note Slag, Analysis of (F. W. Griffin) 432
Bark, Cinchona, Natural History of (H. S. Evans) 405
Barks, Cinchona, Chemical Constituents of (H. S. Evans) 499
Baryta, Hydrate of, Employment of in softening Calcareous and other Waters (E. H. Durden) 352
———, Yellow 68
Bastick, W., Medicated Cod-Liver Oil—Horsley's Patent, Letter on 475
Battery, New Gas, *with cuts* (W. Symons) 208
Beatson, W., Sodium and its Manufacture (*with cut*) 226
Bed of Nitrate of Potash in Pennsylvania 424
Beer, Adulteration of with Cocculus Indicus, Detection of 407
Bell, J., Remarks on the Adulteration of Drugs 489
Bentley, R., Distinctive Characters of the Roots of Aconitum Napellus and Cochlearia Armoracia (*with cut*) 449
———, Monstrosity of the Papaver Bracteatum 398
Berry, G. R., Photography applied to Pharmacy 341
Berthelot and S. de Luca, Artificial Production of Essence of Mustard 180
Berthold, Prof., Tannic Acid a Remedy for Chilblains 185
Bichromate of Potash, Adulteration of 35
Bill, Medical, Analysis of 51
———, Discussion on, in the House of Commons 388
———, Remarks on, extracted from the *Examiner* 482
——— for Session 1856, Remarks on 387
Bimeconate of Morphia, Solution of 288
Bisulphide of Carbon, Characters of the Flame of 563
Black Stain for Wood (C. Karmarsch) 120
Blue, Indigo, Formation of (E. Schunck) 166
—— Pill and Grey Powder, Preparation of (W. W. Stoddart) 322
—— Substance resembling the Colouring Substance of Indigo, occurrence of in Urine (H. Sicherer) ... 42
Bone-Setter, Action against, Norris *v.* Crapper 479
Books Received, see *Reviews*
Botany and Materia Medica, Questions for Examination in 246
Bottle, Stoppered, New Form of (W. Toogood) 535
Bread, Composition of (Dr. Maclagan) 236
———, Detection of Alum in, Letter on (J. Postgate) 325
Brewer, J. W. N., Position and Prospects of Dispensers in the Crimea 187

PAGE

British Association, Meeting of at Glasgow:
Alloys of Iron and Aluminium (Prof. F. C. Calvert) 232
Chemistry of the Adulteration of Food (Dr. Hassall) 233
Composition of Bread (Dr. Maclagan)..... 236
Employment of Algæ and other Plants in the Manufacture of Soaps (Chevalier de Claussen) 238
Hancornia Speciosa, Artificial Gutta Percha, and India Rubber (Chevalier de Claussen) 237
Lithographs, Process for obtaining by the Photographic Process (Prof. Ramsey) 232
Metals of the Alkaline Earths (Dr. Matthiessen) 231
New Form of Cyanic Acid (Baron Liebig) 231
Papyrus, Bonapartea, and other Plants which can furnish Fibre for Paper Pulp (Chevalier de Claussen) 236
Phosphorescence and Composition of Plate Sulphate of Potash (Prof. Penny) 231
Process for obtaining and purifying Glycerine (G. F. Wilson)... 233
Titaniferous Iron of the Mersey Shore (Dr. Edwards) 232
Brown, D. R., Sweet Spirit of Nitre 400
Brown, E. D., Preparation of Oxygen 469
Brown Chrome..... 69
Buchner, A., Arsenic, Detection of in cases of Poisoning 38
——— Purification of Arsenical Sulphuric Acid..... 39
Bye-Laws, Confirmation of by the Secretary of State, Correspondence relating to 56

Cactus, Fruit of, Alcohol from 519
Calomel, Preparation of in the Wet Way (Muck and Zinkeisen) 374
Calvert, Prof., Alloys of Iron and Aluminium 232
Canadian Isinglass, Note on (Prof. Owen) 272
Candidates who have passed the Major Examination... 3, 56, 197, 294, 393. 447, 486
——— Minor Examination, 3, 57, 197, 294, 393, 447, 486
Caoutchouc, Extraction of (M. Weddell) 116
Carbon, Sulphuret of, Application of (E. Deiss) 517
——— Bisulphide of, Characters of the Flame of 563

PAGE

Carbonate and Iodate of Potash, Test for in Iodide of Potassium (W. Copney)..... 504
——— of Soda, Solubility of (H. Lœwel) 228
——— Remarks on H. Lœwel's Paper on (M. Payen) 229
Cassia, Oil of, Artificial, Preparation of (M. A. Strecker)..... 180
Cements, Hydraulic (M. F. Kuhlmann)..... 80
Charcoal as a Deoxodizer (J. Robbins) 186
——— Lime, Sand, and Gravel, Deodorizing and Disinfecting Properties of 125
——— as a Medium of Inhalation (S. Darby) 16
——— Poplar 240
Chemical Constituents of Cinchona Barks (H. S. Evans) 499
——— Establishment of the Excise 140
——— History of the Fats (W. Heintz) 425
——— Influence of Electricity, Heat, and Light (C. F. Schönbein) 362, 513
Chemicals in the Paris Exhibition, Notes on.....269, 328
Chemistry of the Adulterations of Food (A. H. Hassall) 233
——— and Pharmacy, Questions for Examination in 246
——— in its Relation to the other Sciences (G. Hamilton)... 545
Chevallier, A., Cost and Consumption of Coal and Gas in Paris..... 124
Chilblains, Tannic Acid a Remedy for (Prof. Berthold)..... 185
Chinese Method of Scenting Tea ... 112
Chloride of Aluminium 336
——— Lime, valuation of by Means of Sulphate of Iron 518
Chloroform and Ether, Preparation of from Methylated Spirit 248
——— Formulæ for the Internal Administration of (M. Dannecy) 563
——— Murder and Suicide by 478
Chromate of Iron, Quantities of Imported into Great Britain 71
——— Lime, Manufacture of... 34
——— Lead 66
——— Potash 32, 66
——— Zinc, Clark's Patent for the Manufacture of 68
Chromates, Chromic Acid, &c., Manufacture of 32, 66
——— of Zinc, Baryta, and Copper 67
Chrome Alum 528
——— Brown..... 69

PAGE

Chrome Colours of the Electric Light and Colour Company 69
——— Green 69
——— Light 68
——— Ores, Modes of ascertaining the value of 36
——— Red, Runge's..... 68
——— Scarlet 69
——— Yellow 66
———————, French..... 66
Chromic Acid 69
Cinchona Bark, Natural History of (H. S. Evans) 405
——— Barks, Chemical Constituents of (H. S. Evans) 499
——— Introduction of the Culture of into Java 471
Citrate of Magnesia, Effervescing... 288
——————————— Soluble, Preparation of (M. E. Robiquet)..... 184
Clarification of Rape Oil (R. Wagner) 43
Claussen, Chevalier de, Employment of Algæ and other Plants in the Manufacture of Soap 238
——————————— Hancornia Speciosa, Artificial Gutta-Percha, and India-Rubber..... 237
——————————— Papyrus, Bonapartea, and other Plants which can furnish Fibre for Paper Pulp 236
Club, Phytological, *see* Phytological Club
Coal, Peat, and Gas, Cost and Consumption of in Paris (A. Chevallier) 124
Cocoa, Nuts of, Nutritive Properties of the Mass which remains after the Expression of (W. Hamilton) 350
Cod-Liver Oil, Medicated, Horsley's Patent, Letter on (W. Bastick)... 475
Coffee and Chicory, New Method of detecting Adulterations or Mixtures of..... 286
Colours, Citron and Lemon 68
Committee Meetings at the House of Commons relative to the Adulteration of Drugs, &c. 84, 126, 442, 520, 565
———————, Pharmacopœia, Remarks on, and Progress of 51
Concentrated Infusion of Senna (Mr. Abraham) 15
Concentration 556
Constitution of Flame, *with cut* (W. Hilgard) 73
Contact Action, some Phenomena of (C. F. Schönbein) 370
Conversazione 535
Copaiba, Wood Oil a Substitute of (D. Hanbury) 321

PAGE

Copney, W., Meteorology of the West of London 415
———————, Nitrate of Silver and Tannic Acid in Pills 65
———————, Test for Carbonate and Iodate of Potash in Iodide of Potassium 504
Cormac, H. Mac, Indigenous Opium 430
Correspondents, Answers to, 48, 96, 144, 192, 240, 288, 336, 384, 432, 480, 527, 568
Cotton, Gun, a New 430
Couch Grass, Production of Alcohol from (M. Rabourdin) 178
Cough Lozenges 96
Council, List of, 1856—57 544
Council, Meetings of:
Confirmation of the Bye-Laws by the Secretary of State, Correspondence relating to 56
Election of President, Vice-President, &c., 1855 3
Proposed Prizes 393
Resolutions respecting the Award of Medals for Essays, &c..... 447
Result of Correspondence between the Solicitors of the Society and two Chemists and Druggists ... 245
Council, Report of, for 1855 538
Council, Special Meeting of:
Resignation of Mr. Waugh and Election of Mr. Edwards as Vice-President..... 3
Council of the Pharmaceutical Society, Prizes offered by, Remarks on 434
Court of Exchequer Chamber:
The Queen *v.* the Registrar of the Pharmaceutical Society—Judgment 5
Criminal Poisoning, Remarks on ... 289
———————, the Slow Poisoning Case at Burdon, Remarks on 290
Cruciferous Oil, Detection of, when mixed with any other Fruit or Seed Oil (M. Mailho)..... 119
Cryolite, Preparation of Aluminium from (H. Rose)..... 371
Crystalline Structure of Iron in Reference to the Nasmyth Gun... 185
Cyanic Acid, New Form of (Baron Liebig) 231
Cyanide of Potassium, Manufacture of..... 281

Dannecy, M., Formulæ for the Internal Administration of Chloroform 563
Dantec, W., Process for Purifying Water for Preventing Incrustation in Steam Boilers, &c..... 317

PAGE
Darby, S., Charcoal as a Medium of Inhalation 16
Death by Essential Oil of Almonds 430
Decomposition of Fats, Mr. Tilghman's Process for..... 4
——— Mr. Wilson's Process for..... 4
Deer, Musk (*with cut*)... 472
Deiss, E., Application of Sulphuret of Carbon 517
Deodorizing and Disinfecting Properties of Charcoal, Lime, Sand, and Gravel..... 125
Deville, M. H. St. Claire, Manufacture of Aluminium 71
——— Reduction of Metals by Hydrogen 424
Dichromate of Lead..... 68
Diluted Acids and Alkalies of the Pharmacopœias (F. Kendall)..... 490
——— of the Pharmacopœia (R. W. Giles) 409
——— Mineral Acids of the Pharmacopœias (P. Squire) 394
——— Waters of the Pharmacopœia 454
Discoveries, Interesting 186
Dispensers in the Crimea, Position and Prospects of (J.W. N. Brewer) 187
Distribution of Prizes, 1855 246
Dixon *v.* Bell. Staffordshire County Court 45
Donations to the Library and Museum ...4, 197, 245, 294, 394, 449, 486
Draper, H., Oxidation of Metals, Prevention of 564
Druggists' Early Closing Association, Glasgow 527
Drugs, Adulteration of (Dr. Hassall and Mr. Redwood) 248
——— ——— Letter on ... 189
——— and Food, Adulterations of, Committee Meetings in the House of Commons relative to...84, 126, 442, 520, 565
——— Penalty for selling to Brewers and Publicans 47
Durden, E. H., Employment of Hydrate of Baryta in softening Calcareous and other Waters..... 352
——— New Materials for the Manufacture of Paper..... 30

Early Closing Association, Glasgow 527
——— Movement :
Notice respecting the Closing of Chemists' Shops at Hammersmith 287
Education and Recreation 101
Edwards, J. B., Titaniferous Iron of the Mersey Shore 232
Effervescing Citrate of Magnesia... 288
PAGE
Election of President, Vice-President, &c., 1855 3
Electrical Relations of Lead and Antimony in various conducting Liquids (G. Gore) 413
——— Tin and Iron in various Liquids (G. Gore)..... 357
Electricity, Heat, and Light, Chemical Influence of (C. F. Schönbein) 362, 513
Electro-Deposition, List of Patents in connexion with 274
——— Practical Rules and Recipes in (G. Gore) 21, 59, 105, 154, 211, 274
Elephant, Destruction of 92
Elæsaccharum Anisi 192
Errata 96, 144, 336, 337
Essence of Mustard, Artificial Production of (Berthelot and S. de Luca)..... 180
——— Rennet..... 568
Essential Oil of Almonds, Poisoning by 377, 430
Ether and Chloroform, Preparation of from Methylated Spirit..... 248
—— Gelatinization of (M. Grimault) 184
Ethics, Professional, Remarks on 337, 389, 437
Evans, H. S., Chemical Constituents of Cinchona Barks 499
——— Natural History of Cinchona Bark 405
Examinations, Major and Minor, Candidates who have passed, *see Candidates who have passed the Major and Minor Examinations*
Excise, Chemical Establishment of 140
Exhibition of the Products of Industry of all Nations, Paris 147
Extemporaneous Hydrocyanic Acid, Manufacture of..... 423
Extraction of Caoutchouc (M. Weddell) 116
Extracts, Vegetable (Mr. Southall) 350
Extractum Arnicæ 240

Faraday, Prof., Lecture on certain Magnetic Actions and Affections, Notice of 476
——— Letter on the State of the Thames 91
Fats, Acidification of, Spontaneous (M. Pelouze)..... 40
—— Chemical History of (W. Heintz) 425
—— Decomposition of, Mr. Tilghman's Process for..... 4
——— Mr. Wilson's Process for 40
Ferrocyanide of Potassium, Manufacture of 219
Ferrosulphate of Quina 48

PAGE
Fifteenth Anniversary of the Pharmaceutical Society 536
Filter, New 185
Financial Statement for 1855...446, 538
Flame, Constitution of, *with cut* (W. Hilgard) 73
Float, Glass, Mayo's Patent (*with cut*)..... 198
Food and Physic, Adulteration of, and the Pollution of Water 53
Formulæ for the Internal Administration of Chloroform (M. Dannecy) 563
Formulæ, Secret (J. Ince) 103
Fraud and Adulteration, Remarks on 338
—— Ingenious..... 327
French Chrome Yellow 66

Gas Battery, New Form of, *with cut* (W. Symons) 208
—— Peat, and Coal, Cost and Consumption of in Paris (A. Chevallier) 124
Gelatinization of Ether (M. Grimault) 184
Giles, R. W., Diluted Acids of the Pharmacopœia 409
Gingerine 192
Glass Float, Mayo's Patent (*with cut*)..... 198
Glonoïne, or Nitro-Glycerine (M. J. E. Vrij)..... 229
Glycerine Jelly 519
———— Process for obtaining and purifying (G. F. Wilson) 233
Gore, G., Electrical Relations of Lead and Antimony in various Conducting Liquids..... 413
———————— Tin and Iron in various Liquids 357
——— List of Patents in connexion with Electro-Deposition..... 274
——— Position of Aluminium in the Thermo-Electric Scale..... 506
——— Practical Rules and Recipes in Electro-Deposition 21, 59, 105, 154, 211, 274
Graham, Hofmann, and Redwood, Profs., Report on the Supply of Spirit of Wine Free of Duty..... 28
Grain, various Kinds of, cultivated for Food, Remarks on (Mr. Grindon) 266
Graminaceæ, Natural Order of, Useful Products from (T. C. Archer) 548
Green, Chrome..... 69
——— Pigment, Preparation of 43
Griffin, F. W., Analysis of Bank-Note Slag 432
——— Composition of Bank-Note Slag 353

PAGE
Grimault, M., Gelatinization of Ether 184
Grindon, Mr., Remarks on various Kinds of Grain cultivated for Food 266
Groves, T. B., Tribasic Phosphate of Soda 275
Grundy, Mr., Development of the Vegetable Cell 14
Guibourt, M., Tragacanth and some allied Gums 59
Gum Mezgnite (C. Morfitt) 42
Gums, Indian (T. C. Archer) 15
Gun-Cotton, a New..... 430

Hair Dye 144
Hall, M., Note on the Detection of Strychnia 376
Hallows, W. A., Death of 335
Hamilton, G., Chemistry in its Relation to the other Sciences 545
Hamilton, W., Notes on the Materia Medica of the Paris Exhibition... 410
———————— Nutritive Properties of the Mass which remains after the Expression of the Nuts of the Cocoa..... 350
———————— Decease of..... 568
Hanbury, D., Wood-Oil, a substitute for Copaiba 321
Hancornia Speciosa, Artificial Gutta-Percha, and India-Rubber (Chevalier de Claussen)..... 237
Haselden, A. F., on the Suggestion to substitute Aqua Lauro-Cerasi, &c., for Hydrocyanic Acid..... 468
Hassall, A. H., Adulteration of Annatto..... 295
———————— Chemistry of the Adulterations of Food..... 233
———————— Ovation to 531
———————— Supplementary Remarks on the Adulteration of Annatto.... 323
Heintz, M., Chemical History of the Fats..... 425
Hermodactyls (J. E. Planchon) 465, 500
Hewitt's Pulverizing Machine (*with cut*)..... 207
Hilgard, W., Constitution of Flame (*with cut*) 73
Honey, Purification of..... 121
Hornsby, G. G., on the Process for obtaining Oxygen 352
Houlton, J., Syrupus Ferri Iodidi 564
Houzeau, A., Researches on Oxygen in a Nascent State 181
Hubbuck, Mr., Remarks on Oxide of Zinc 488
Hydrate of Baryta, Employment of in softening Calcareous and other Waters (E. H. Durden) 352

PAGE

Hydraulic Lime, Artificial Stones, and some New Applications of the Soluble Alkaline Silicates (M. F. Kuhlmann) 80
———— and Cement, Durability of 37
Hydriodic Acid, Syrup of (J. Murdoch) 63
Hydrocyanic Acid, Extemporaneous, Manufacture of 423
———— Manufacture of 421
———— (Wittstein) 429
———— On the Suggestion to Substitute Aqua-Lauro-Cerasi for (A. F. Haselden) 468
Hydrophobia, a New Remedy for... 430
Hyposulphite of Potash 144
———— of Soda, Employment of in Analytical Chemistry (W. Vohl) 564

Illegal Weights 485, 529
Ince, J., Review of Dr. Mialhe's Work, *Chemistry in its Application to Physiology and Therapeutics* ... 379
———— Latest from the Crimea... 551
———— Secret Formulæ 103
———— Trade Pharmacy 507
Incrustation of Boilers, Method of preventing, M. Duclos de Boussois' Patent for 374
———— of Steam Boilers, Process for purifying Water for preventing (W. Dantec) 317
Indian Gums (T. C. Archer) 15
India-Rubber of the Amazon, Note on (R. Spruce) 117
Indican 170
Indigenous Opium (H. M'Cormac) 430
Indigo Blue, Formation of (E. Schunck) 166
Indiretine and Indihumine 171
Infusion of Senna, Concentrated (Mr. Abraham) 15
———— Sumbul 508
Ingenious Fraud 327
Interesting Discoveries 186
Internal Administration of Chloroform 563
Iodide of Ammonium 192
———— Cadmium 240
Iron and Aluminium, Alloys of (Prof. Calvert) 232
—— Chromate of, Quantities of imported into Great Britain 70
—— Crystalline Structure of in reference to the Nasmyth Gun ... 185
—— Pure Protosulphate of 192
—— and Tin, Electrical Relations of in various Liquids (G. Gore)... 357
—— Titaniferous, of the Mersey Shore (J. B. Edwards) 232

PAGE

Isinglass, Canadian, Note on (Prof. Owen) 272
Jar, Preparation, New, Description of (*with cut*) 463
Jelly, Glycerine 519
Judgment in the Case of the Queen *v.* the Registrar of the Pharmaceutical Society 5
Juries, Annoyance 484

Karmarsch, C., Black Stain for Wood 120
Kendall, F., Acids and Alkalies, Diluted, of the Pharmacopœias ... 490
Kuhlmann, F., Hydraulic Lime, Artificial Stones, and New Applications of the Soluble Alkaline Silicates 80
Kumis and Raky of the Tartars ... 429
Kummell, F., Method of decolourizing Tannin 120

Latest from the Crimea (J. Ince) ... 551
Lead and Antimony, Electrical Relations of in various conducting Liquids (G. Gore) 413
—— Chromate of 66
—— Commercial Acetate of (J. Mackay) 315
—— Dichromate of 68
—— Poisoning with 141
—— and Zinc, Double Chromate of 69
Leeshing, Mr., Method of Testing Archil 40
Lefort, J., Purification of Antimony 227
Lemon Yellow 67
Legislation, Medical, Remarks on 481
Library, Donations to, 4, 197, 245, 294, 394, 449, 486
Licence, Patent Medicine 149
————Plate 287
Liebig, Baron, New form of Cyanic Acid 231
Lime and Cement, Hydraulic, Durability of 37
—— Chloride of, Valuation of by means of Sulphate of Iron 518
—— Chromate of, Manufacture of 34
Limited Liability, Remarks on 385
List of Council, 1856—57 544
List of Members, Associates, and Apprentices, 3, 56, 197, 294, 393, 447, 486
———— Observations on 49
——, New, of Members, &c., Observations on the Preparation of ... 193
Lithographs, Process for obtaining by the Photographic Process (Prof. Ramsey) 232
Liverpool Chemists' Association: Additional Contributions to the Museum Fund 16

PAGE

Liverpool Chemists' Association:—
Annual Meeting, 1855 150
Chemical Constituents of Cinchona Barks (H. S. Evans) ... 499
Chemistry in its relation to the other Sciences (G. Hamilton) 545
Concentrated Infusion of Senna (Mr. Abraham) 15
Council for the Year 1855—56 ... 202
Distribution of Prizes..... 16
Donations to the Library and Museum, 202, 262, 317, 340, 498, 499, 500, 545
Financial Report, 1854—55 152
Indian Gums (T. C. Archer)..... 15
Natural History of Cinchona Bark (H. S. Evans) 405
Photography applied to Pharmacy (G. R. Berry) 341
Process for Purifying Water for preventing Incrustation in Steam-Boilers, &c. (W. Dantec) 317
Remarks on two Patents for the prevention of Incrustations of Steam-Boilers 341
Report of the Council, 1854—55 150
Useful Products of the Natural Order Graminaceæ, Lecture on (T. C. Archer)..... 548
Useful Products of the Natural Order Palmaceæ, Lecture on (T. C. Archer)..... 263
Lœwel, H., Solubility of Carbonate of Soda 228
Lozenges, Cough 96
Lyman, S. J., & Co., Oleum Morrhuæ cum Quina, Letter on..... 239

Macadam, S., Manufacture of Soap 400
Macfarlan, J. F., Methylated Spirit and some of its Preparations..... 310
Mackay, J., Commercial Acetate of Lead 315
Maclagan, Dr., Composition of Bread 236
Magnesia, Citrate of, Effervescing 288
———— Soluble, Preparation of (M. E. Robiquet)..... 184
———— Sulphate of, as a substitute for Sulphuric Acid 285
Magnetic Actions and Affections, Lecture on (Prof. Faraday) 476
Mailho, M., Detection of a Cruciferous Oil when mixed with any other Fruit or Seed Oil 119
Maisch, J. M., Physicians and Pharmaceutists, and their Relations 438
Major and Minor Examinations, Candidates who have passed, *see* Candidates who have passed the Major and Minor Examinations
Maltass, S. H., Tragacanth and its Adulterations 18

PAGE

Mammoth Tree from California ... 519
Manchester Pharmaceutical Association:
Address issued by the Committee 153
———— by Mr. Woolley, President 205
Adulteration of Beer with Cocculus Indicus, Detection of ... 407
Annual Meeting, 1856: Report of the Committee 549
Award of Botanical Prizes..... 206
Discussion on Mr. Headlam's Medical Bill 463
—— ———— relative to the Use of Methylated Spirit 265
Hewitt's Pulverizing Machine (*with cut*) 207
Photography, Paper on (Mr. Ransome) 408
Poisons, Paper on (Mr. Wilkinson) 464
Remarks on various kinds of Grain cultivated for Food (Mr. Grindon) 266
On Sugar, its Pharmaceutical Use (Mr. Robertson) 319
Marigold Yellow 67
Materia Medica of the Paris Exhibition, Notes upon 267, 332, 342
———————— (W. Hamilton) 410
Matthiessen, Dr., Metals of the Alkaline Earths 231
Maumené, M., Alteration of Sugar dissolved in Water 41
Mayo's Patent Glass Float (*with cut*) 198
Medal, Pereira, Description of, and Remarks on the Award of the Prizes generally 195
Medical Bill, Analysis of 51
———— Discussion on in the House of Commons..... 388
———— Remarks on, extracted from the *Examiner* 482
———— for Session 1856, Remarks on 387
——— Legislation, Remarks on ... 481
Medicated Cod-Liver Oil—Horsley's Patent, Letter on (W. Bastick) 475
Medicinal Plants, Australian..... 114
Medicine Stamp, Remarks on by a Correspondent 431
Medicines and Medical Stores to be kept on board Merchant Ships, Scale of 276
———— Scale of for Merchant Ships, Letter on 287
———— Supply of to Merchant Vessels, Letter on (H. R. Peacock and T. E. Tennent)..... 475
Medium Yellow 67
Meeting, Adjourned: Election of Council, 1856—57 543
Meeting of the British Association, *see* British Association, Meeting of

PAGE

Meetings of Council:
Confirmation of the Bye-Laws by the Secretary of State, Correspondence relating to 56
Election of President, Vice-President, &c., 1855 3
Proposed Prizes 393
Resolutions respecting the Award of Medals for Essays, &c. 447
Result of Correspondence between the Solicitors of the Society, and two Chemists and Druggists 245
Meeting of Council, Special:
Resignation of Mr. Waugh, and Election of Mr. Edwards, as Vice-President 3
Meetings, Pharmaceutical, 4, 197, 245, 294, 394, 449, 486
Members, Associates, and Apprentices, List of, 3, 56, 197, 294, 393, 468
———————, &c., Preparation of a new List of, Observations on 193
Mercury, Neutral Nitrate of 518
——— of New Almaden, California (W. S. W. Ruschenberger) 558
Metals of the Alkaline Earths (Dr. Matthiessen).. 231
——— Oxidation of, Prevention of (H. Draper) 564
——— Reduction of by Hydrogen 424
Metamorphosis of Saccharine Matter (Dr. Pavy) 283
Meteorite or Aërolite, supposed, found in the trunk of a tree, in the Battersea Fields (Sir R. I. Murchison) 161
Meteorology of the West of London (Mr. Copney) 415
Methylated Spirit, Letter on (W. Wilkinson) 351
———————— Manufacture of Chloroform and Ether from 248
———————— Regulations for the Preparation and Sale of 138
———————— Sale of, Correspondence relating to 238
———————— and some of its Preparations (J. F. Macfarlan)... 310
Microscope, Use of against Thieves 478
Mineral Acids, Diluted, of the Pharmacopœias (P. Squire) 394
——— Waters of Algiers, Natural, Note on (Sir J. Oliffe) 273
Monstrosity of the Papaver Bracteatum (R. Bentley) 398
Morfit, C., Gum Mezgnite..... 42
Morphia, Solution of, Bimeconate of 288
Murchison, Sir R. I., Supposed Aërolite or Meteorite found in the trunk of an old Tree in the Battersea Fields..... 161

PAGE

Murder and Suicide by Chloroform 478
Murdoch, J., Syrup of Hydriodic Acid 63
Museum, Donations to, 4, 197, 245, 294, 394, 449, 486
Musk Deer (*with cut*) 472
Mustard, Essence of, Artificial Production of (Berthelot and S. de Luca)..... 180

Nasmyth Gun, Crystalline Structure of Iron in reference to..... 185
Natural Mineral Waters of Algeria, Note on (Sir J. Oliffe)..... 273
Neutral Nitrate of Mercury 518
Newspapers and Books, Postage on 44
Nitrate of Potassa, Poisoning by (J. Snowden) 140
———— Potash, Bed of in Pennsylvania..... 424
———— Silver and Tannic Acid in Pills 65
Nitre, Sweet Spirit of (D. R. Brown) 400
Nitro-Glycerine, or Glonoïne (M. J. E. Vrij)..... 229
North British Branch of the Pharmaceutical Society:
Address by Dr. Maclagan 255
Annual Dinner..... 498
——— Meeting, 1856, Report of Council, &c. &c. 496
Apparatus for taking the Specific Gravity of Floating Bodies, *with cut* (Mr. Stevenson) 493
Award of Prizes 492
Commercial Acetate of Lead (J. Mackay) 315
Description of a New Preparation Jar (*with cut*) 463
Donations to the Museum 405
Introductory Remarks by Mr. Gardner..... 254
Manufacture of Soap (S. Macadam) 400
Methylated Spirit and some of its Preparations (J. F. Macfarlan) 310
Note from Prof. G. Wilson on the Remission of the Tax on Water Stills 316
Notice of Meeting of the Board of Examiners 405
——— of proposed Lectures, &c., for Session 1855—56 ....., 201
Pharmacy as a Branch of Technology (G. Wilson)..... 457
Specimens of Scammony 310
Sweet Spirit of Nitre (D. R. Brown) 400
Register Fund Prize Essay.—Subject: "*The Best Mode of Preparing Tinctures*" 317
Valedictory Address by the President, Mr. Gardner 494

PAGE
North London Microscopical Analytical Sanitary Society 339
Northcote, A. B., Function of Salt in Agriculture 172
Nutgalls, Remarks on..... 544
Nuts of the Cocoa, Nutritive Properties of the Mass which remains after the Expression of (W. Hamilton)..... 350

Obituary: W. A. Hallows 335
Oil of Almonds, Essential, Poisoning by 377
—— Cassia, Artificial, Preparation of (A. Strecker) 180
—— Cod-Liver with Quina, Letter on (S. J. Lyman and Co.) 239
—— Cruciferous, Detection of, when mixed with any other Fruit or Seed Oil (M. Mailho) 119
—— of Juniper, Pyroligneous 509
—— Rape, Clarification of (R. Wagner) 43
—— Wood, a Substitute for Copaiba (D. Hanbury) 321
Ol. Hydr. Gall..... 374
Oleum Morrhuæ cum Quina 480
———————— Letter on (S. J. Lyman and Co.) 239
Oliffe, Sir J., Natural Mineral Waters of Algeria, Note on..... 273
Opium, Indigenous (H. M'Cormac) 430
Ovation to Dr. Hassall 531
Owen, Prof., Note on Canadian Isinglass 272
Oxidation of Metals, Prevention of (H. Draper) 564
Oxide of Zinc, Pure, for Use in Medicine 486
———————— Remarks on (Mr. Hubbuck) 488
Oxygen in a Nascent State 238
———Preparation of (E. O. Brown) 469
———————— (H. M. Witt) 411, 503
——— Process for obtaining (G. G. Hornsby) 352
——— Researches on in a Nascent State (A. Houzeau)..... 181
Ozone, Constitution and Properties of (T. Andrews) 183

Palmaceæ, Natural Order of, Useful Products from, Lecture on (T. C. Archer) 263
Palmer's Trial, Remarks on 532
Paper, New Materials for the Manufacture of (Mr. Durden)..... 30
——— Pulp, Plants which can furnish Fibre for (Chevalier de Claussen) 236

PAGE
Papyrus, Bonapartea, and other Plants which can furnish Fibre for Paper Pulp (Chevalier de Claussen) 236
Papaver Bracteatum, Monstrosity of (R. Bentley)..... 398
Paris Exhibition, Notes upon the Chemicals in 269, 328
———————— Materia Medica of 267, 332, 342
———————— (W. Hamilton) 410
Passing Events..... 531
Patent Medicine Licence 149
Pavy, Dr., Metamorphosis of Saccharine Matter 283
Payen, M., Remarks on H. Lœwel's Paper on the Solubility of Carbonate of Soda..... 229
Peat, Gas, and Coal, Cost and Consumption of in Paris (A. Chevallier) 124
Pelouze, M., Spontaneous Acidification of Fats 40
Penalty for selling Drugs to Brewers and Publicans 47
Penny, Prof., Plate Sulphate of Potash, Phosphorescence and Composition of..... 231
Per-centage System..... 96
Pereira Medal, Description of, and Remarks on the Award of the Prizes generally 195
Periodicals, Transmission of through the Post..... 194
Pharmaceutical Chemists, Register of, and the List of Members of the Society, Remarks on 49
———————— Jurisprudence..... 1
———————— Society, Proceedings against: Judgment in the Case of the Queen *v.* the Registrar of the Pharmaceutical Society 5
———————— Responsibility of under the Pharmacy Act, Remarks on 241
———————— Transactions of, *see Transactions of the Pharmaceutical Society*
———————— Students and their Studies 145
Pharmacopœia Committee, Remarks on and Progress of 51
———————— Diluted Waters of ... 454
Pharmacy Act, Responsibility of the Pharmaceutical Society under, Remarks on 241
———————— as a Branch of Technology (G. Wilson) 457
———————— in the Crimea, Remarks on 242
———————— Trade (J. Ince) 507

PAGE
Phenomena of Contact Action (C. F. Schönbein) 370
Phosphate of Soda, Tribasic (T. B. Groves) 275
Photography applied to Pharmacy (G. R. Berry) 341
——————— Conditions of Success and Causes of Failure..... 560
——————— Paper on (Mr. Ransome) 408
Physic and Food, Adulteration of, and the Pollution of Water 53
Physicians and Pharmaceutists, and their Relations (J. M. Maisch)... 438
Phytological Club:
Development of the Vegetable Cell (Mr. Grundy) 14
Election of Officers for 1856—57 340
List of Specimens for Distribution 398
Monstrosity of the Papaver Bracteatum (R. Bentley) 398
Notice of a Botanical Excursion 492
——— relating to Duplicates of Botanical Specimens 201, 254
——— of Notes by Mr. Hanbury on a Day's botanizing in the Mountains of the Vosges 310
——— of some Nutgalls..... 544
Observations on the Extinction of the Palm-Tree in Syria 457
Third Annual Meeting, 1856..... 340
Pigment, Green, Preparation of ... 43
Pill, Blue, and Grey Powder, Preparation of (W. W. Stoddart) ... 322
Pipitzahoic Acid 375
Planchon, J. E., Hermodactyls, 465, 500
Plants, Australian, Medicinal 114
Plate Licence 287
Poisoning by Aconite, Accidental... 477
————————————, Letter on (C. H. Leet) 520
——————— Criminal, Remarks on ... 289
——————— Detection of Arsenic in Cases of (A. Buchner) 38
——————— by Essential Oil of Almonds 377
——————— by Lead 141
——————— by Nitrate of Potassa (J. Snowden) 140
——————— Remarks on..... 436
——————— Slow, Remarks on the case at Burdon 290
——————— Suspected case of 140
——————— by Strychnine..... 478
————————————— Suspected 325
——————— Suspected, by a Quack ... 189
Poisons, Paper on (Mr. Wilkinson) 464
Pollution of the Thames, Remarks on 54
Populin 378
Post, Transmission of Periodicals through 194
PAGE
Postage on Newspapers and Books 44
Postgate, J., Detection of Alum in Bread, Letter on 325
Potash, Bichromate of, Adulteration of 35
——— Carbonate and Iodate of, in Iodide of Potassium, Test for (W. Copney) 504
——— Chromate and Bichromate of, Manufacture of.....32, 66
——— Nitrate of, Bed of in Pennsylvania..... 424
——— Plate, Sulphate of, Phosphorescence and Composition of (Prof. Penny) 231
——— Red Prussiate of, Manufacture of 219, 280
——— Yellow Prussiate of, Manufacture of 219, 278, 511
Potassio-Tartrate of Antimony in Solution, Decomposition of, Means of Preventing 286
Potassium, Cyanide of, Manufacture of 281
——————— Ferrocyanide of, Manufacture of 219
Potato Starch, the Starch of Fritillaria Imperialis as a substitute for 564
Preparation Jar, New, Description of (*with cut*) 463
Press, Tincture, *with cut* (M. G. Weber) 273
Prizes, Distribution of 246
——— offered by the Council of the Pharmaceutical Society, Remarks on 434
Procter, W., Large Dose of Antimony 351
Professional Ethics, Remarks on 337, 389, 437
Prospects and Position of Dispensers in the Crimea (J. W. N. Brewer)..... 187
Protiodide of Tin 480
Protosulphate of Iron, Pure 192
Provincial Transactions, *see* Transactions, Provincial.
Prussian Blue from Gas Liquors ... 511
——————— Manufacture of 423
————————————————— by means of the Nitrogen of the Atmosphere 423
——————— as prepared by the Electric Light and Colour Company 512
——————— Read's Patent Soluble 424
Prussiate of Potash, Yellow, Manufacture of 219, 278, 511
Prussic or Hydrocyanic Acid, Manufacture of 421
Pulverizing Machine, Hewitt's (*with cut*)..... 207

PAGE
Purification of Honey 121
———— Water supplied to Towns, &c. (Dr. Clark) 553
Pyroligneous Oil of Juniper 509

Quack, Suspected Poisoning by a... 189
Quantitative Estimation and Analytical Separation, Methods of ... 121
Queen, The, *v.* the Registrar of the Pharmaceutical Society, Judgment in the case of 5
Questions for Examination in Botany and Materia Medica 246
———————— in Chemistry and Pharmacy 246

Rabourdin, M., Production of Alcohol from Couch Grass..... 178
Raky and Kumis of the Tartars..... 429
Ramsey, Prof., Process for obtaining Lithographs by the Photographic Process 232
Ransome, Mr., Paper on Photography 408
Rape Oil, Clarification of (R. Wagner) 43
Read's Patent Soluble Prussian Blue 424
Recreation and Education 101
Red Prussiate of Potash, Manufacture of 280
Reduction of Metals by Hydrogen (M. St. Claire Deville) 424
Redwood, T., Remarks on the alleged Adulteration of Annatto..... 198
Register of Pharmaceutical Chemists and the List of Members of the Society, Remarks on..... 49
Registers of the Pharmaceutical Society, Remarks on 433
Registered Apprentices, List of, *see Apprentices, Registered, List of*
Remedy for Hydrophobia 430
Rennet, Essence of 568
Report of Profs. Graham, Hofmann, and Redwood, on the Supply of Spirit of Wine free of Duty..... 28
Responsibility of the Pharmaceutical Society under the Pharmacy Act, Remarks on 241
Reviews:
The Art of Perfumery, and the Methods of obtaining the Odours of Plants (by G. W. Septimus Piesse)..... 288
Chemistry in its Application to Physiology and Therapeutics (Dr. Mialhe)..... 179
The Essentials of Materia Medica, Therapeutics, and the Pharmacopœia (by A. B. Garrod) 191
Reviews: PAGE
The Medicinal and Economic Properties of Vegetable Charcoal (by James Bird) 288
Medicines: their Uses and Mode of Administration (by J. Moore Neligan, M.D.)..... 143
Pharmacopoea Austriaca 92
Pharmacopoea Norvegica 92
A Translation of the New London Pharmacopœia (by J. Birkbeck Nevins, M.D., &c.) 93
Robbins, J., Charcoal as a Deoxidizer 186
Roberton, Mr., Sugar, its Pharmaceutical Use 319
Robiquet, E., Process for the Preparation of Soluble Citrate of Magnesia 184
Roots of the Aconitum Napellus and Cochlearia Armoracia, Distinctive Characters of, *with cut* (R. Bentley)..... 449
Rose, H., Preparation of Aluminium from Cryolite 371
Royal Institution:
On certain Magnetic Actions and Affections, Lecture on (Prof. Faraday) 476
Inferences from the Negation of Perpetual Motion, Notice of Lecture on..... 379
Runge's Chrome Red 68
Ruschenberger, W. S. W., Notes on the Mercury of New Almaden, California 558

Saccharine Matter, Metamorphosis of (Dr. Pavy) 283
Saffron, Production of in Kashmere 226
Salt, Functions of in Agriculture (A. B. Northcote) 172
Sanitary Commission, Analysis of... 292
———Speculations: North London Microscopical Analytical Sanitary Society 339
Scale of Medicines for Merchant Ships 276
———————— Letter on 287
Scarlet Chrome 69
Schönbein, Chemical Influence of Electricity, Heat, and Light 362, 513
———— Phenomena of Contact Action 370
Schunck, E., Formation of Indigo Blue 166
Secret Formulæ (J. Ince) 103
Seidlitz Spring..... 528
Senna, Concentrated Infusion of (Mr. Abraham) 15
Sheep-Ointment: Wills *v.* Towers... 567

PAGE

Sicherer, H., Occurrence in Urine of a Blue Substance resembling the colouring Substance of Indigo 42
Silica, Source of in Carbonate of Potash, obtained by Calcination of the Bitartrate 38
Silicates, Alkaline, Chemical History of (M. Struckmann) 82
Silicium, Remarks on (F. Wöhler) 561
Silver, Nitrate of, and Tannic Acid in Pills 65
——— Reduction of (J. Wiggen) ... 322
Slag, Bank Note, Analysis of (F. W. Griffin) 432
———————— Composition of (F. W. Griffin)..... 353
Snowden, J., Poisoning by Nitrate of Potassa..... 140
Soap, Manufacture of (S. Macadam) 400
———————— Employment of Algæ and other Plants in (Chevalier de Claussen)..... 238
Soda, Carbonate of, Solubility of (H. Lœwel) 228
———————— Remarks on H. Lœwel's Paper on (M. Payen) 228
—— Hyposulphite of, Employment of in Analytical Chemistry (W. Vohl)..... 564
—— Tribasic Phosphate of (T. B. Groves) 275
Sodium and its Manufacture, *with cut* (W. Beatson)..... 226
Solution of Bimeconate of Morphia 288
Southall, Mr., Vegetable Extracts... 350
Specific Gravity of Floating Bodies, New Apparatus for taking, *with cut* (Mr. Stevenson)..... 493
Spirit, Methylated, Preparation of Chloroform and Ether from 248
———————— Regulations for the Preparation and Sale of 138
———————— Sale of, Correspondence relating to 238
———————— and some of its Preparations (J. F. Macfarlan)... 310
———————— Use of, Letter on (W. Wilkinson) 351
Spirit of Wine, Supply of free of duty, Report on by Profs. Graham, Hofmann, and Redwood..... 28
———————— Sale of, Remarks on 102
Spruce, R., Note on the India-rubber of the Amazon 117
Squire, P., Diluted Mineral Acids of the Pharmacopœias..... 394
Staffordshire County Court—Dixon *v.* Bell 45
Starch of Fritillaria Imperialis as a Substitute for Potato Starch..... 564

PAGE

State of the Thames, Letter on (Prof. Faraday) 91
Statistics of Apothecaries and Druggists (W. Willmott)..... 188
Stevenson, Mr., New Apparatus for taking the Specific Gravity of Floating Bodies (*with cut*) 493
Stoddart, W. W., Preparation of Blue Pill and Grey Powder 322
Stoppered Bottle, New Form of (Mr. Toogood) 535
Strecker, A., Preparation of Artificial Oil of Cassia 180
Struckmann, M., Chemical History of the Alkaline Silicates..... 82
Strychnine, Note on the Detection of (M. Hall) 376
———— Poisoning by 478
———— Suspected Poisoning by 325
———— Test for 520
Students, Pharmaceutical, and their Studies 145
Sugar, Alteration of dissolved in Water (M. Maumené)..... 41
——— its Pharmaceutical Use (Mr. Roberton) 319
Sulphate of Magnesia, as a Substitute for Sulphuric Acid 285
Sulphuret of Carbon, Application of (E. Deiss) 517
Sulphuric Acid, Arsenical, Purification of (A. Buchner) 39
———————— Note on the Testing of (Wittstock) 376
———————— Purification of from Arsenic 375
Sumbul, Infusion of..... 508
———— Tincture of 508
Supply of Medicines to Merchant Vessels, Letters on (H. R. Peacock and T. E. Tennent)..... 475
Sweet Spirit of Nitre (D. R. Brown) 400
Symons, W., New Gas Battery (*with cut*) 208
Syrup of Hydriodic Acid (J. Murdoch) 63
Syrupus Ferri Iodidi (J. Houlton) 564

Tannate of Zinc 192
Tannic Acid and Nitrate of Silver in Pills 65
———— a Remedy for Chilblains (Prof. Berthold) 185
Tannin, Method of Decolourizing (F. Kummell) 120
Tea, Chinese Method of Scenting... 112
Test for Strychnine..... 520
———— Carbonate and Iodate of Potash in Iodide of Potassium (W. Copney) 504

PAGE

Thames, State of, Letter on (Prof. Faraday) 91
Tin and Iron, Electrical Relations of in various Liquids (G. Gore) 357
Tinctura Radicis Arnicæ 508
——— Sumbuli 508
Tincture Press, *with cut* (M. G. Weber) 273
——— Warburg's 288
Titaniferous Iron of the Mersey Shore (J. B. Edwards) 232
Toogood, Mr., New Form of Stoppered Bottle 535
Trade Pharmacy (J. Ince)..... .. 507
Tragacanth and its Adulterations (S. H. Maltass) 18
——— some allied Gums (M. Guibourt) 57
Transactions of the Pharmaceutical Society, 3, 56, 197, 245, 294, 340, 393, 446, 486, 535
Transactions, Provincial:
Liverpool Chemists' Association:
Additional Subscriptions to the Museum Fund 16
Address of the President 202
Annual Meeting, 1855, Report of the Council, &c. 150
Chemical Constituents of Cinchona Barks (H. S. Evans) 499
Chemistry in its relation to the other Sciences, Lecture on (G. Hamilton) 545
Concentrated Infusion of Senna (Mr. Abraham) 15
Council for the Year 1855—56 202
Distribution of Prizes..... 16
Donations to the Museum, 202, 262, 317, 340, 498, 499, 500
Financial Report, 1854—55 ... 152
Indian Gums (T. C. Archer)... 15
Natural History of Cinchona Bark (H. S. Evans)..... 405
Photography applied to Pharmacy (G. R. Berry)..... 341
Process for Purifying Water for Preventing Incrustation in Steam-Boilers, and other Purposes (W. Dantec) 317
Remarks on Two Patents for the Use of Baryta for the Prevention of Incrustation in Steam Boilers 341
Useful Products of the Natural Order Palmaceæ, Lecture on (T. C. Archer)..... 263
Useful Products of the Natural Order Graminaceæ (T. C. Archer)..... 548
Manchester Pharmaceutical Association:
Address issued by the Committee..... 153

PAGE

Transactions Provincial:
Manchester Pharmaceutical Association:
Address (by Mr. Woolley) 205
Adulteration of Beer with Cocculus Indicus, Detection of... 407
Annual Meeting, 1856: Report of the Committee..... 549
Award of Botanical Prizes ... 206
Discussion on Mr. Headlam's Medical Bill 463
——— relative to Methylated Spirit..... 265
Hewitt's Pulverizing Machine (*with cut*) 207
Photography, Paper on (Mr. Ransome) 408
Poisons, Paper on (Mr. Wilkinson) 464
Remarks on various Kinds of Grain cultivated for Food (Mr. Grindon) 266
On Sugar: its Pharmaceutical Use (Mr. Roberton) 319
Transmission of Periodicals through the Post..... 194
Tree, Mammoth, from California ... 519
Tribasic Phosphate of Soda (T. B. Groves)..... 275

Urine, Occurrence of a Blue Substance in, resembling the Colouring Substance of Indigo (H. Sicherer) 42

Vegetable Cell, Development of (Mr. Grundy) 14
——— Extracts (Mr. Southall)... 350
Vohl, W., Employment of Hyposulphite of Soda in Analytical Chemistry..... 564

Warburg's Tincture 288
Water, Purification of supplied to Towns, &c..... 553
Waters, Calcareous, &c., Employment of Hydrate of Baryta in softening (E. H. Durden) 352
Weber, M. G., Tincture Press (*with cut*)..... 273
Weddell, M., Extraction of Caoutchouc..... 116
Weights, Illegal 485, 529
——— Stamping of..... 485
Wheatstone, C., Position of Aluminium in the Voltaic Series..... 373
Wiggin, J., Reduction of Silver ... 322
Wilkinson, Mr., Methylated Spirit, Letter on 351
——— Paper on Poisons ... 464
Willmott, W., Statistics of Apothecaries and Druggists 188
Wills *v.* Towers 567

PAGE

Wilson, Prof., Letter on the Remission of the Tax on Water Stills 317
Wilson, G., Pharmacy as a Branch of Technology 457
——— Process for obtaining and purifying Glycerine..... 233
Witt, H. M., Preparation of Oxygen 411, 503
Wittstein, Preparation of Hydrocyanic Acid 429
Wittstock, Note on the Testing of Sulphuric Acid..... 376
Wöhler, F., Remarks on Silicium... 561
Wood, Black Stain for (C. Karmarsch) 120
—— Oil, a Substitute for Copaiba (D. Hanbury) 132

PAGE

Yellow, Baryta..... 68
——— Chrome 66
——— French Chrome 66
——— Lemon 67
——— Marigold 67
——— Medium 67
——— Prussiate of Potash, &c., Manufacture of.....219, 278, 421, 511

Zinc, Baryta, Copper, &c., Chromates of..... 67
—— Chromate of, Clarke's Patent for the Manufacture of 68
—— Oxide of, Pure, Remarks on (Mr. Hubbuck)..... 488
——————— for Use in Medicine 486
—— Tannate of 192

END OF VOL. XV.

C. WHITING, BEAUFORT HOUSE, STRAND.